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SMALL ARMS DEFENSE JOURNAL | VOLUME 13 NUMBER 6 | NOV/DEC 2021

SMALL ARMS DEFENSE JOURNAL

VOL 13, NO 6 | NOV/DEC 2021

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PHOTO: Bryan Ferreira

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Spartan Armor Systems' new **Hercules Level IV Ceramic Body Armor** offers wearers maximum protection without sacrificing comfort. Designed using Spartan Armor's Advanced Compound Curve (ACC) feature, Hercules is a true multi-curve design providing the wearer an extremely comfortable fit. This advanced ergonomic design is especially important during extended duty engagements, typical of law enforcement, military, and security operations.

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Both products feature Multi-Profile Tactical Headset technology including active noise reduction (ANR), active noise cancellation (ANC), and dual mode with ANR/ANC simultaneously. Both are backwards compatible with TCI single communications systems and feature industry leading sound localization for maximum situational awareness and threat detection.

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The new Portuguese army service handgun, the Glock 17 Gen5 in coyote.

Major Morgado, of the Portuguese Paratroopers, fires his secondary weapon in preparation for his mission in the Central African Republic. The new Glock 17 issued to this elite Portuguese Unit is already being deployed to Africa with excellent performance in the harsh conditions of that continent.

The Portuguese Army Gets a New Pistol

Portuguese Army's New Custom Coyote Glock 17 Gen5 Handgun Enters Service

By Bryan Ferreira

In 2018 the Portuguese army began the process of fitting its soldiers with a new sidearm through the NATO Support and Procurement Agency, NSPA. In 2019, the tender for the purchase of new pistols was concluded with Glock winning a contract for an initial batch of approximately 3,000 custom Glock 17 Gen5 pistols, replacing the army's veteran Walther P38 9x19mm pistols.

The army's requirements for its new pistol were simple. The gun had to be in service in a NATO country, be coyote or FDE colored in order

Portuguese commandos train transitions from their combat shotguns to their new Glock 17 Gen5 handgun.

"The handgun has excellent ergonomics and with its combat focused design, any problem can be solved fast."

Major Morgado
Portuguese paratrooper

to provide better camouflage than black, it would have to have a standard size barrel, and would have to have an ammo capacity of at least 15 rounds in the magazine. In terms of mechanics, the weapon had to have no external safeties so it could be employed quickly, as the pistol is most likely to be used in urgent circumstances. It also had to be safe to carry with a round in the chamber and be drop safe. It also needed to be ambidextrous and come equipped with metal night sights and three magazines. Finally, the Portuguese called for a hammerless design in order to limit access to external debris.

Richard Flür, director of international sales at Glock GmbH said, "We are proud to be selected to support the missions of the Portuguese military with the latest generation of Glock pistols. The Portuguese Army is among multiple military and law enforcement entities which Glock strongly supports in the region and we are excited to welcome them to the Glock family."

The pistol comes with all of the Gen 5 features, but with some additional ones taken from the Glock 19X. Namely the coyote color of the frame, slide and magazines, the steel night sights, and the lanyard clip.

Major Morgado, a Portuguese paratrooper issued the new pistol, says, "The handgun has excellent ergonomics and with its combat focused design, any problem can be solved fast."

With this acquisition, the Portuguese army, which recently bought FN SCAR assault rifles, is now equipped with one of the best combinations of military small arms. This upgrade was important as the Portuguese army's elite

Major Morgado, of the Portuguese Paratroopers, practices transitions from his rifle to his secondary weapon in preparation for his mission in the Central African Republic.

units (paratroopers and commandos) have been engaged in some heavy firefights in the United Nations Multidimensional Integrated Stabilization Mission (MINUSCA) in the Central African Republic (CAR).

The Glocks are already deployed to CAR and are reportedly performing well. CAR has a very hot and humid weather and a persistent, heavy red dust in the air that sticks to everything. This red dust gets worse in the rainy season, where it turns into mud and complicates combat operations. Soldiers on the ground are pleased with their new pistols and all reports are favorable in terms of maintenance and reliability. The new pistols are also being deployed to other Portuguese army areas of operations, also with excellent reports. SADJ

Portuguese Paratroopers have been training extensively with the new Glock 17 Gen5 in preparation for their mission in the Central African Republic. The use of a secondary weapon is essential in the type of mission that the Portuguese QRF has been executing, with lots of close quarters encounters with the local armed groups.

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Cartridges begin as punch cups that are then elongated (drawn) through a series of forming dies until they reach the desired shape.

Explosives, Propellants and Ignition – A Chronological Journey (Part 3)

Primers come in several basic sizes for rifle and pistol cartridges and remain the most dangerous component part of the fully loaded cartridge.

By Paul Evancoe

In the preceding two parts of this series, we discussed the evolution of various chemical compositions used to prime, or ignite, the main propellant charge along with the various firearms mechanical systems, a.k.a. "locks", that were devised to use them. We looked at the percussion cap which preceded the primer cap and how it directly led to the invention of the primer cap. We also discussed the ammunition renaissance that began in the mid-1800s as breechloading small arms were invented that first used cap-fired paper cartridges, and within a decade transitioned to rim fired brass cartridges, then center fired brass cartridges. In this, the final part of our chronological journey (Part 3), we'll explore the development of metallic cartridges and modern primer caps.

In the early days of metallic cartridge evolution, there were no standardized guns, actions, or calibers for metallic cartridges. Most early metallic cartridges were developed in conjunction with a particular gun that fired them. This "one-off" production was fraught with interoperability and reliability problems, but it did solidify the foundation for standardizing metallic cartridge production and the operating systems of the firearms that used them.

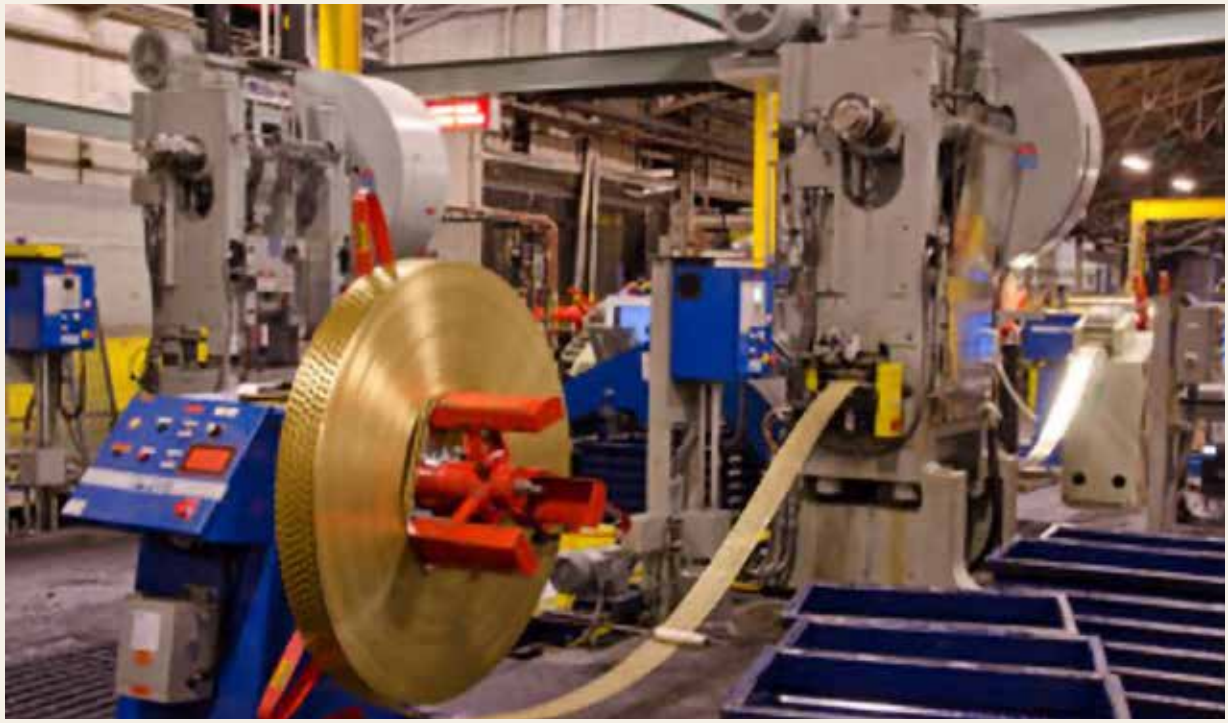
"In fact, .22 Short revolvers were carried as personal weapons by soldiers during the American Civil War."

Rimfire Cartridge

The rimfire cartridge was the first standardized type of metallic cartridge – and it still survives to this day. The first rimfire cartridge began in the form of the BB Cap that was invented in France around 1845 by Frenchman Louis-Nicolas Flobert. The BB Cap was specifically designed for the Flobert indoor target (gallery) rifle and fired a .22 caliber lead ball from a very short primer cap rimfire case. The rimfire primer compound also served as the propellant - no additional powder was used.

Using a 29-grain lead round nose (RN) bullet, the .22 Short was introduced in 1857. The .22 Short uses a lengthened BB Cap case with the primer cast into its hollow cartridge base rim (rimfire). A few grains of black powder were added into the lengthened case for increased power. The .22 Short holds the distinction of being the first American metallic cartridge that was chambered in the first Smith & Wesson revolver designed for personal protection – not plinking. In fact, .22 Short revolvers were carried as personal weapons by soldiers during the American Civil War. You never see that forgotten history depicted in any movies or documentaries of that era. Enduringly, it is still used all over the world today; to include the Olympics'

"Development of these early high velocity pistol cartridges by Mauser and Luger directly led to the development of the 9mm Luger..."



Cartridges begin as brass cups punched from sheet brass. The cups then undergo a multistep cartridge die forming process. Die forming machinery costs around $500,000 for each caliber.

rapid-fire pistol event.

In 1871 a longer case of the same .22 diameter was developed for the 29-grain lead round nose bullet used in the .22 Short. Thus, the .22 Short morphed into the .22 Long cartridge. In 1887, a few years later, because of the .22's budding popularity, the Stevens Arms Co. developed the .22 Long Rifle cartridge. This used the previously developed .22 Long case with a 40-grain lead round nose bullet loaded with more powder for higher velocity than the .22 Long's 29-grain round. The .22 Long Rifle cartridge was a colossal success and was adapted to both rifles and pistols; becoming the most popular sporting and target shooting cartridge in the history of firearms. Modern .22 Long Rifle High Velocity cartridges drive a 40-grain lead round nose bullet at an average rifle muzzle velocity of 1255 fps. Following the advent of smokeless powder, the .22 cartridge was loaded with the new, cleaner burning propellant and the lead bullet was copper plated to reduce lead fouling of the barrel.

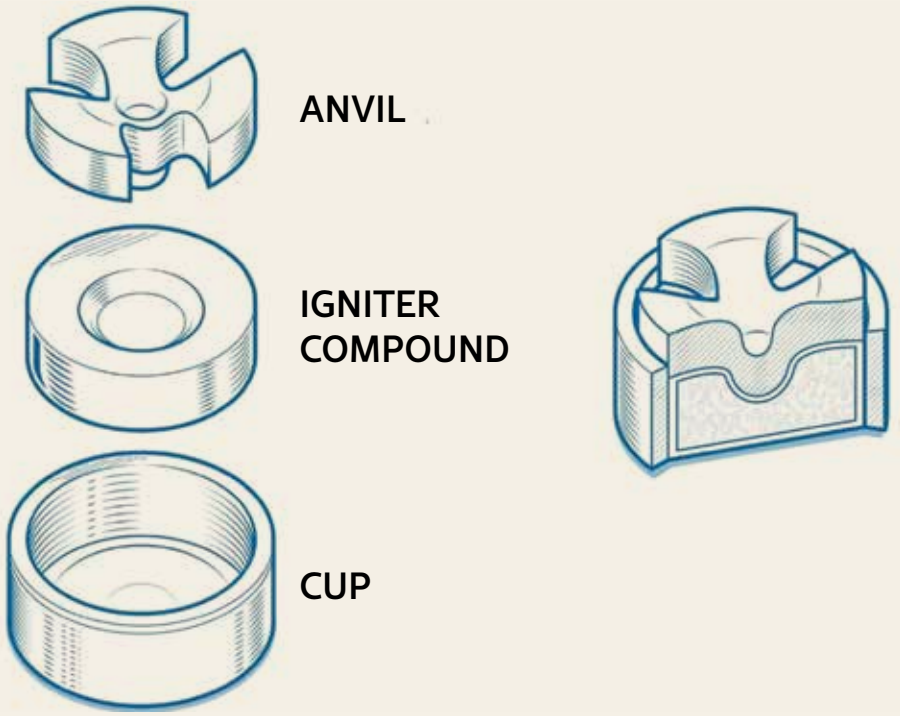
Developed in 1860, the Spencer rifle was the first truly successful American repeating rifle produced in volume. The Spencer fired the brass cased .56-56 Spencer rimfire cartridge (.56 caliber lead bullet powered by 56 grains of black powder). By 1862 it played a pivotal role in the American Civil War by providing superior firepower to the Union forces, especially during the battle of Gettysburg. The Spencer was also used in the latter stages of the Civil War for the same firepower advantage.

Following the proven performance of the Spencer cartridge, a multitude of large bore rimfire cartridges were developed and became popular. Some remained in production right up to the beginning (1939) of World War II. The most historically important of these rimfire cartridges is the .44 Henry Flat. Invented by B. Tyler Henry, the Henry lever action rifle fired the .44 Henry Flat rimfire cartridge. The Henry repeating rifle quickly demonstrated its superiority over the muzzle-loaded rifle when it was rolled out onto the battlefield in 1862, effectively providing a quantum leap to single soldier firepower.

In late 1864 Oliver Winchester purchased Henry's company during a protracted legal dispute. A couple of years later, the Henry rifle evolved into the brass framed Winchester Model 1866 "Golden Boy" rifle, which was ironically chambered for the .44 Henry Flat rimfire round. Henry remained the chief designer for Winchester Repeating Arms and is credited for designing all the famous Winchester rifles that "Won the West." Well into the next century, all Winchester rimfire ammunition was headstamped with an "H" in honor of B. Tyler Henry.

Centerfire

Even with these many successes, Henry and Winchester both realized that a more powerful cartridge was necessary for the demands of the western frontier and that pursuit led to the development of the centerfire .44-40 Winchester cartridge (44 grain lead bullet powered by 40 grains of black powder). Still using the basic Henry lever action, the brass frame was ditched in favor of the steel frame Winchester Model 1873 rifle which was designed to withstand the higher pressure of the .44-40. Loaded with modern smokeless powder today, the .44-40 cartridge is still in use. Except for the .30-30 Winchester,



Primer caps have three parts: the metallic cup, the primer compound, and the anvil. Here's how they work. As the firing pin strikes the primer cup's base it pinches the anvil against the primer compound. This generates the friction that ignites the primer compound, which in turn ignites the powder charge.

the 44-40 is credited with slaying more deer than any other cartridge.

Because of its desirable attributes, the .44-40 was also adapted to handguns, where its rimmed case design made it ideal for use as a revolver cartridge. It became one of the most popular cartridges for the famous 1873 Colt Single Action Army revolver (the Peacemaker), along with the classic .45 (Long) Colt cartridge, also introduced in 1873. Both these cartridges are chambered in today's revolvers, with the .45 Colt remaining most popular for personal defense, hunting, and cowboy action competition.

Rimless Cartridges

All these early brass cartridge-firing rifles used tubular magazines, or, in the case of handguns, were single action revolver designs --and without exception, they were all slow loading. The quest was on to develop rifles and pistols that were fed from magazines that could be readily changed when empty. By the end of the 19th Century, autoloading pistols were developed. These new pistols used box magazines that were loaded with "rimless" cartridges. Rimless cartridges do have an extraction rim, but it is the same diameter as the cartridge body.

" ...the .30-30 Winchester was the first high velocity, smokeless powder sporting rifle cartridge developed in the U.S...."

One of the first successful rimless pistol cartridges was the little remembered .30 Borchardt. Developed by American Hugo Borchardt in 1893 as ammunition for his box magazine fed Borchardt pistol, the duo marked the first successful autoloading pistol. Peter Mauser implemented a higher-pressure version of the Borchardt cartridge as the .30 Mauser (7.63x25mm) for his "broom handle" pistol of 1896. That pistol design was later improved upon by Georg Luger, who developed the .30 Luger (7.65x21mm) cartridge in 1900. Development of these early high velocity pistol cartridges by Mauser and Luger directly led to the development of the 9mm Luger (9x19mm) pistol cartridge, introduced in 1902. To this day, the 9x19 remains the most popular service pistol and sub-machinegun cartridge used on planet Earth.

Smokeless Powder

Credited with ending the era of black powder loaded cartridges, the .30-30 Winchester was the first high velocity, smokeless powder sporting rifle cartridge developed in the U.S. Originally loaded with a black powder that propelled 165 grain .30 caliber bullet, the .30-30 cartridge only generated a 1,400 fps muzzle velocity. Comparatively, the new .30-30 smokeless powder cartridge pushed the same bullet to 2000 fps, while realizing a 200-yard point blank range possible for the first time. This smokeless ammunition upgrade served to revolutionize the sporting firearms ammunition industry by driving new firearms and cartridge designs.

The famous Winchester Model 1894 rifle chambered in .30-30 and the Model 94 chambered in .32 Special went on to become the most popular centerfire rifle and cartridge combinations ever invented. They ushered in the age of the small bore, bottleneck sporting rifle cartridges. The .25-35, 7-30 Waters, and .32 Winchester Special, among other cartridges, are all based on the .30-30 cartridge case.

Early Rimless Rifle Cartridges

The rimless rifle cartridge followed. An early example of the early rimless rifle cartridge was the 7.9x57mm (.318-inch diameter bullet) developed in 1888 by J. Mauser. A 7x57mm version (.275 diameter bullet) of the 7.9x57 Mauser cartridge made its debut in 1892 based on the same case necked down to accept 7mm bullets, which was later offered as a chambering in Mauser rifles. The German Mauser bolt action Model 88 Commission rifle proved to be a sturdy work horse that was replaced in 1898 by the familiar Mauser Model 98, which is still popular with collectors and sportsmen today. In 1905 the spitzer bullet design of slightly larger diameter (8mm or .323-inch) was adopted using the original cartridge 7.9x57 case by simply expanding its neck diameter. This cartridge was the famed 8x57JS, which became a world-wide hunting cartridge that is still in use to this day.

"The primer cap remains the most significant firearms innovation since the invention of black powder…"

These German-developed cartridges established most of the critical parameters for the standard rimless rifle cartridges that followed, including the basic rim diameter of .473 inches used for the .30-06, and .308 Winchester cartridge families, as well as the majority of other subsequent (non-magnum) centerfire rifle cartridges.

Magnum Cartridges

The first "magnum" rifle cartridge was developed by the legendary British arms manufacturer, Holland & Holland in 1912. The "magnum" name was borrowed from the French word describing their extra-large size bottles of Champagne and H&H applied it to the extra-large and powerful (belted) cartridge case. If nothing else, it was splendid marketing.

Just like the 7x57 and 8x57 Mauser served to standardize rifle cartridges, Holland and Holland's .375 H&H Magnum cartridge case, also known as the H&H .375 Belted Rimless Magnum, set the standard for magnum rifle cartridges. Holland and Holland uniquely belted the casing with a raised belt that extends above the diameter of the lower casing wall. This belt serves to set the head space when the cartridge is installed into the gun's firing chamber. Without the belt, the rimless case would have no control limit to its installed distance from bolt face to bullet end at the throat of the rifle's bore. This belting innovation generated dozens of subsequent magnum sporting cartridges, including other H&H magnums, Weatherby magnums, Norma magnums, and Winchester standard and short magnums, along with the popular 7mm Remington Magnum, and the 6.5mm Remington short magnum cartridges.

The Primer Cap

Given proper ascendency, metallic cartridges could not have been possible without the invention of the primer cap. The primer cap remains the most significant firearms innovation since the invention of black powder, as well as the least understood part of a centerfire cartridge. The primer cap is a more sophisticated version of the percussion cap and is specifically designed to be inserted (pressed) into the pocketed base of a metallic cartridge.

To best understand how modern primer caps work, it is important understand their internal construction and the chemistry that goes into making the volatile slurry that is pressed between the primer's cup and anvil. Without comparison, primer compound is the most dangerous substance involved in ammunition manufacturing (to include hand loading). While modern gunpowder is flammable, mishandling primer compound will surely result in explosive misfortune, and that's exactly why each individual primer gets its own protective cutout in its shipping box.

The primary explosive (about 40%), used in modern primers is lead styphnate (discussed previously in Part 2 of this series). Barium nitrate (about 40%) is added as an oxidizer to oxygen enrich the explosive. Tetrazene (about 4%) is also added as a sensitizer to facilitate detonation. The remaining additive elements (about 16%) are fuels. The specific ingredients in primer compounds vary slightly from one ammunition manufacturer to another. However, the general formulas have remained

A Primer Primer

A quick chronological review of the major primer developments that led to today's primer cap.

1805: Forsyth Compound

Scottish Reverend and avid waterfowl hunter, Alexander Forsyth developed percussion ignition using mercury fulminate to eliminate the flaring flash of his flintlock that alerted the incoming birds.

1814: Metal Cap-nipple System

Joseph Shaw encased the Forsyth compound in a metal cap, inventing the cap-nipple system. This was later replaced with an anvil as part of either the case or the primer.

1848: Mercury Fulminate

The percussion cap completely transitioned to mercury fulminate compound along with the addition of oxidizer in the compound.

1898: H-48

Designated H-48, the U.S. Army adopted this potassium chlorate-based priming compound as its first successful non-mercury-based primer.

1911: FA-70

A mix of potassium chlorate and lead thiocyanate, FA-70 was reliable and accurate but corrosive primer. It was used to prime .45 ACP and .30/06 service standard ammunition in both WWI and WWII.

1914: Lead Styphnate

German chemist Edmund Von Herz synthesized and patented the mono lead salt of trinitroresorcinol, more commonly known as lead styphnate.

1928: SINOXID Primer

Dynamit Nobel patented the first styphnate-based primer mixture. Non-corrosive and far less toxic, it is the basis for all current modern priming systems.

remarkably constant over many decades. This is because shooters are obstinately unwilling to tamper with any recipe that is tried and true. Most importantly, primers must reliably fire when a firing pin strikes them. Whether the shooting environment is freezing cold or sweltering hot, or whether the gun is pointing down or straight up, reliable ignition of the powder charge is paramount, even at the risk of accuracy.

Primer caps have three parts: the metallic cup, the primer compound, and the anvil. Here's how they work. Here's how they work. When the firing pin strikes the primer cup's base it causes the anvil to pinch the primer compound against the anvil. This generates the friction that ignites the primer compound, which in turn ignites the powder charge. For perspective, a human eye blink lasts 100,000 microseconds. The entire primer detonation process lasts between 200 and 1,500 microseconds (one microsecond is a millionth of a second). During this extremely short time period three things happen. The primer compound is ignited. Once ignited it generates flame and hot particulate matter in the form of slag and burning metal. In turn, this creates a gaseous high velocity pressure front that penetrates and subsequently ignites the main propellant.

Ideally, when the primer discharges, the flame and hot metal slags penetrate deeply into the cartridge's column of gunpowder achieving the chimeric goal of igniting each grain of powder simultaneously. The expectation in a perfect world would be for the hot slag to spread evenly throughout the powder - thoroughly distributing its searing heat throughout the powder column. Many believe the primer ignites every grain of powder by providing just the right amount of pressure for uniform ignition thus providing the ammunition the greatest possible consistency from shot-to-shot. But that is not the case.

The compactness of the powder charge within the powder column (think of the brass cartridge case as a chimney) and gravity, to a lesser extent, both play a role. Most commercial ammunition doesn't use compressed powder charges, but some who reload do. Some believe that compressed powder charges (with no air space between the bullet and the primer for the powder granules to relax in) will get more consistent accuracy results. However, this can make the primer's ignition of the powder less efficient and here's why. The high-pressure wave of slag and flame generated by ignition of the primer can compact the powder column even more, retarding its thorough penetration. The result is uneven powder ignition. Inconsistent ignition of the powder column directly translates to inconsistent burn pressure and that means inconsistent accuracy.

Lead-Free Primers

There is currently a renaissance in lead-free primer technology in conjunction with the newest high-performance powders, bullets, and precision brass. The latest generation of primers, for example, offered by Federal Ammunition, is called "Catalyst." The development of the Catalyst primer was driven by a U.S. government requirement - both military and law enforcement, for a lead or other potentially toxic metals-free primer. Catalyst offers a degree of perfection over traditional lead styphnate-based primers because the formulation is composed of lead-free compounds that are purposely tailored for shotgun, rifle and handgun loads. The goal was a lead-free primer with superior reliability and accuracy combined – a refreshing concept.

To achieve this goal, Catalyst primer formulations use non-toxic explosive compounds; 60% bismuth oxide (bismuth is non-toxic and has about the same specific gravity as lead), 20% nitrocellulose, 10% aluminum, and 10% fuels and sensitizers. The aluminum sensitizes the explosive nitrocellulose, and it heats the bismuth oxide which releases its oxygen, thereby boosting the explosive reaction. The aluminum also burns with the bismuth creating a thermite-like heat. The remaining 10 percent of the primer compound is a blend of fuels, sensitizers and binders necessary for explosive sustainment.

In developing this formula, Federal created a primer with performance that far eclipses the older lead styphnate-based primer. How so? The Catalyst formula propels more hot, heavy metals, while producing less pressure from gases, into the propellent bed than any other primer system. The result is a more thorough, and consistent, powder burn. It is also more compatible with modern propellants and doesn't degrade the powder it contacts during storage like traditional lead styphnate primers can over time. This means the shelf life of Catalyst-primed ammunition is extended by many years. Yes, there have been other lead-free primers available for decades. However, they have not been considered reliable enough for duty ammunition and have been subsequently relegated to use in training ammo.

Cartridge Cases

Part 2 of this series discussed the use of paper cartridges and how they led to the brass metallic cartridge case. That sounds relatively easy, but at that early time metal cartridge case forming consistency was a manufacturing dilemma. The emergence of brass cartridge cases in the mid-1800s was made possible by the Industrial Revolution's metallurgical process advancements in forming and fabrication, along with the necessary steam engine-powered machinery to accomplish close tolerance mass production.

If you consider it, a cartridge case is nothing more than a container for the primer cap, powder and bullet. For rifles and handguns, it is usually a cylindrical tube, normally made of brass, steel or polymer material. It holds the bullet at the neck, the propellant charge inside, and the primer cap in its base. Cartridge cases are classified into five types according to the configuration of their bases, e.g., rimmed, semi-rimmed, rimless, rebated and belted.

Of these five types there are three basic cartridge case wall shapes, straight cased, tapered cased and bottlenecked. Identifying them is easy. Straight cased has a case diameter that is approximately the same along its length. Tapered cased has a wide base that gradually reduces in diameter along its length to the bullet end. Bottlenecked has a wide-bodied case that is reduced in diameter to that of the bullet just before the case mouth, giving it a shoulder and bottleneck profile.

Straight wall cartridges came first largely out of necessity so the new metallic black powder powered car-

tridges could be fired through pistols and rifles converted from cap and ball. Secondly, the metal forming technology to make bottlenecked smokeless powder-fueled cartridges and the firearms to utilize them didn't yet exist.

Here are some examples of the more common straight wall cartridges in use today: .38 Special/.357 Magnum, 9mm Luger, .45 ACP, .45 Long Colt, .444 Marlin, .45-70 Government, .450 Bushmaster, and .50 Beowulf.

Straight-wall cartridges, by design, have less internal volume for propellant. This means firearms chambered for them tend to fire slower velocity rounds (usually around 1,200 fps or less) and therefore have less range than firearms that fire bottlenecked cartridges. This reduced range makes them desirable for self-defense and hunting in populated areas.

Although accuracy can be impacted by many factors (including shooter skill level), it's generally accepted that a straight-wall cartridge is more reliable and accurate than a shotgun slug. While not delivering the same range as a comparable bottleneck round, most straight-wall cartridges will provide greater effective range than the typical shotgun slug. However, when comparing straight-wall to bottleneck cartridges, the main shortfall is range. For example, bottleneck rounds like the .308 Winchester have more effective range (by many hundreds of yards) than, for example, the .45-70 Government straight-wall cartridge.

Brass is the most used metal for cartridge cases. Why? Brass is an alloy of copper and zinc, with a few trace elements. The peculiar brass alloy used to form cartridge casings is called C260, or "cartridge brass". Cartridge brass has malleable qualities that facilitate forming it into cartridges and for easy chamber extraction of a spent cartridge. Another attribute is brass cases won't rust, making it more stable under all environmental extremes than steel cases.

Making the Case

The forming of cartridge cases all begins with brass sheets. The brass is rolled into sheets that are then slit into narrower brass coils in preparation for the cupping press which punches cupped, round slugs from the brass sheets. The cupping press is a multi-punch-per-stroke press that affords a high rate of production. The brass punch cups are captured in bins, and the remaining scrap brass is recycled back to the foundry's melting pot. At this early point in the cartridge making process, the punch out cups are a little wider than they are deep and are very thick walled. The cup is now ready for the case forming process.

"A high-quality casing will have a precisely punched and centered flash hole which is free of burrs, tearing and machining lines…"

The process of forming a cartridge case is called "drawing." The cup undergoes a 3-step process as it's "drawn" into a casing. The first draw lengthens the cup and makes it considerably narrower. The cup is then annealed (heated) to relax the granular structure of the metal enough to continue elongation. The fledging casing must also be washed prior to being put through the next draw process to reduce wall friction during the draw. After the cup has passed through the second draw, the cup is now much longer than it is wide and is starting to look like a close-ended tube. As with the first draw, the cup is annealed and cleaned again prior to its third draw that provides further elongation.

The third draw forms the cup to its total elongated length. At the conclusion of the third draw the casing is pinch trimmed (prior to exiting the draw press) and is now considered a casing. "Pinching" off the extra material at the top of the tube provides a perfectly trimmed-to-length tube ready for the next forming operation. The tube is also washed again prior to being advanced onto the next step of the forming process.

The next steps form the primer pocket and apply the headstamp to the bottom of the casing. First, the casing is "butted" against the pocketing tool. This step creates the primer pocket in the bottom of the casing where the primer cap will be seated. Next the newly pocketed casing progresses to the bunter which flattens the bottom of the casing and imprints the headstamp. The casing is again washed prior to being advanced to the next step of the forming process.

The next step cuts the extraction groove into the base of the casing. This operation involves a cutting tool very similar to a horizontal lathe. The casing is clamped on a spindle and rotated at high speed while the groove profile cutter is pressed against it. The rotation of the casing in combination with the contact of the profile cutter creates the casing's extraction groove. Prior to advancing onto the tapering process, the casing is again annealed to relax the granular structure of the metal.

The casing's next step is to go through the first of three taper presses. If the case is a straight wall case without a bottleneck, not all the following steps will be applied. The first press begins forming the case neck and mouth profile. This step also begins the case's body taper. Body taper is essential to facilitate post firing extraction from the firearm's firing chamber. The second taper press continues to refine the casing body, shoulder, and neck to their near final dimensions. The third taper press forms the casing into its final body, neck, and mouth dimensions. However, the overall casing length is still too long, and the primer cup does not yet have a flash hole. The casing is washed again before advancing to the next forming step.

The next step trims the casing to length. Specially designed precision carbide cutters, which are frequently replaced to maintain precision, are used to prevent burrs on the inside and outside of the casing mouth. This is essential for proper bullet release when fired.

Following this step, the flash hole is punched through the base of the previously formed primer cup. The precision used to punch the flash hole has a significant impact on the performance of the finished casing. A high-quality casing will have a precisely punched and centered flash hole which is free of burrs, tearing and machining lines, essentially an ultra-smooth finish. It is also important that the flash hole is uniformly precise in size from casing to casing to ensure uniform primer ignition from shot-to-shot. These seemingly insignificant manufactur-

ing details can make or break consistent cartridge accuracy.

Next, the casing's mouth and neck are annealed. Annealing the mouth and neck of each casing is important to ensure the casing "grabs" and holds the bullet correctly and releases the bullet uniformly when the cartridge is fired. Induction annealing is mostly used today rather than flame annealing. Unlike flame annealing, used by ammunition manufacturers in the early days, induction annealing provides exacting temperature control for each casing. The casing is now finished and ready for loading.

Case Washing

A quick explanation of the many washes that were mentioned between the case forming steps might be helpful. The wash chemicals are a combination of acids, detergents, and anti-tarnish compounds which effectively remove the lubricant used in the draw processes as well as clean off any tarnish which might have developed during the forming operation. Tarnish adds friction to the extraction of fired brass and that's why reloaders polish fired brass before reloading it.

Steel Casing

Today, steel-cased cartridge ammunition is also available. Most of it is manufactured in Russia or one of the former Soviet Union satellite countries. Steel casings are unique because all the cartridge cases are lacquer coated. The lacquer serves two purposes. First, it helps prevent rust from forming on the cartridge case. Rust and ammunition don't work well together – ever.

Secondly, when hot, the lacquer acts as a lubricant to aid in spent cartridge extraction immediately after firing. When fired, all cartridges swell against the gun's firing chamber as a result of the extreme internal pressure exerted upon the casing wall during powder combustion. Brass is a soft metal, and a spent cartridge is therefore easily pulled from the firing chamber by the bolt's extractor. Steel is not a soft metal like brass and extracting a swollen spent steel casing from the firing chamber without a lubricant would otherwise be hit or miss. The bottom line when using this ammunition is that it is fine for plinking, but it lacks precision in manufacturing which impacts its extraction, reliability, and accuracy negatively-three things that are crucial if you're going to bet your life on it.

"There's no doubt polymer case formulation will be perfected, but until then, the best bet is to stick with brass cased ammunition."

Polymer-Cased Ammunition

Another cartridge slowly making its way into the modern ammunition market is polymer-cased ammunition. While this type of ammunition is being offered by several manufacturers today, and there are advertising testimonials favoring it, polymer-cased ammunition has yet to be proven comparably reliable to brass cased ammunition. There's no doubt polymer case formulation will be perfected, but until then, the best bet is to stick with brass cased ammunition.

Looking Ahead

This completes our chronological journey through the intertwined development of explosives, propellants, initiators, and ammunition. We've seen how they all factored into the subsequent development of firearms and how today's firearms were built upon the foundation of this development. But what might the future hold?

It is unlikely that bullet-firing firearms will ever be eliminated from military or sporting use. This claim can be made with a degree of confidence based upon the historical record and sheer economics. A version of future small arms may well fire particle beams or use propellants that allow caseless ammunition. As we have seen in the developmental chronology presented in this three part series, there are three primary showstoppers for the mainstream incorporation of all firearm innovation. The first is production cost. The second is firearm reliability. The third is accuracy. Imagination and innovation are not included as there are numerous good ideas that simply don't make it successfully past the first three showstoppers.

One must also balance the advantage and cost of replacing the existing firearm with something new and/or improved. For example, if an existing firearm can be replaced with a new firearm that provides exceptional firearm service life expectancy, reliability, and accuracy, well above the firearm in use, for about the same price per gun, then it's worth considering it as a cost-effective replacement. If the new gun costs twice as much but only provides a marginal improvement in life expectancy, reliability and accuracy, it's not worth the cost of replacing the existing firearms. The equation is actually very basic and logical.

Even so, this simple logic is largely overlooked by government procurement authorities. For example, last year U.S. Special Operations Command announced a plan to replace its existing firearms chambered in 7.62x51mm NATO with the 6.5 mm Creedmoor (6.5x48mm) because the 6.5 mm Creedmoor round supposedly delivers better energy at longer distance and is more accurate.

Superficially, that seems like a solid justification. However, what SOCOM didn't consider is the reduced barrel life that results from firing the 6.5mm Creedmoor. On average, 6.5 Creedmoor barrels require replacement after firing about 2,500 rounds because it's such a hot round compared to the 7.62 NATO, which has a proven barrel life of around 5,000 rounds. If barrel life is factored into the replacement decision, it's clearly an expensive mistake to make the change.

The same logic does not necessarily hold true in the sporting world of firearms because an average hunter fires less than 20 rounds a year, so barrel life expectancy is not a concern. Regardless, this is the type of analysis that you should thoroughly contemplate with every firearm purchase. If the history of firearms development has any value at all, the focus of its importance is to understand the design and purpose of the firearms you purchase, and the firearms you shoot. Be smart and be safe. SADJ

SHOW REPORT: MSPO

The Radom Sport 762 sports rifle is a semi-automatic rifle modeled on the Kalashnikov design.

MSPO '21 is Mission Complete!

What Happened at This Year's Polands National Defense Expo

The pandemic has not thwarted Targi Kielce's plan; Kielce has again hosted the global defense market. This year's International Defence Industry Exhibition and LOGISTYKA International Logistics Fair hosted almost 11,000 guests from all over the world. The exhibition was graced with the presence of President of the Republic of Poland, Andrzej Duda, the Minister of National Defence, Mariusz Błaszczak, and the Head of the National Security Bureau, Paweł Soloch.

For years, MSPO has been a meeting place for the global defense industry's giants. This year's expo was no exception; 400 companies from 27 countries participated in the trade show. Kielce hosted more than a dozen foreign delegations, in addition to almost 11,000

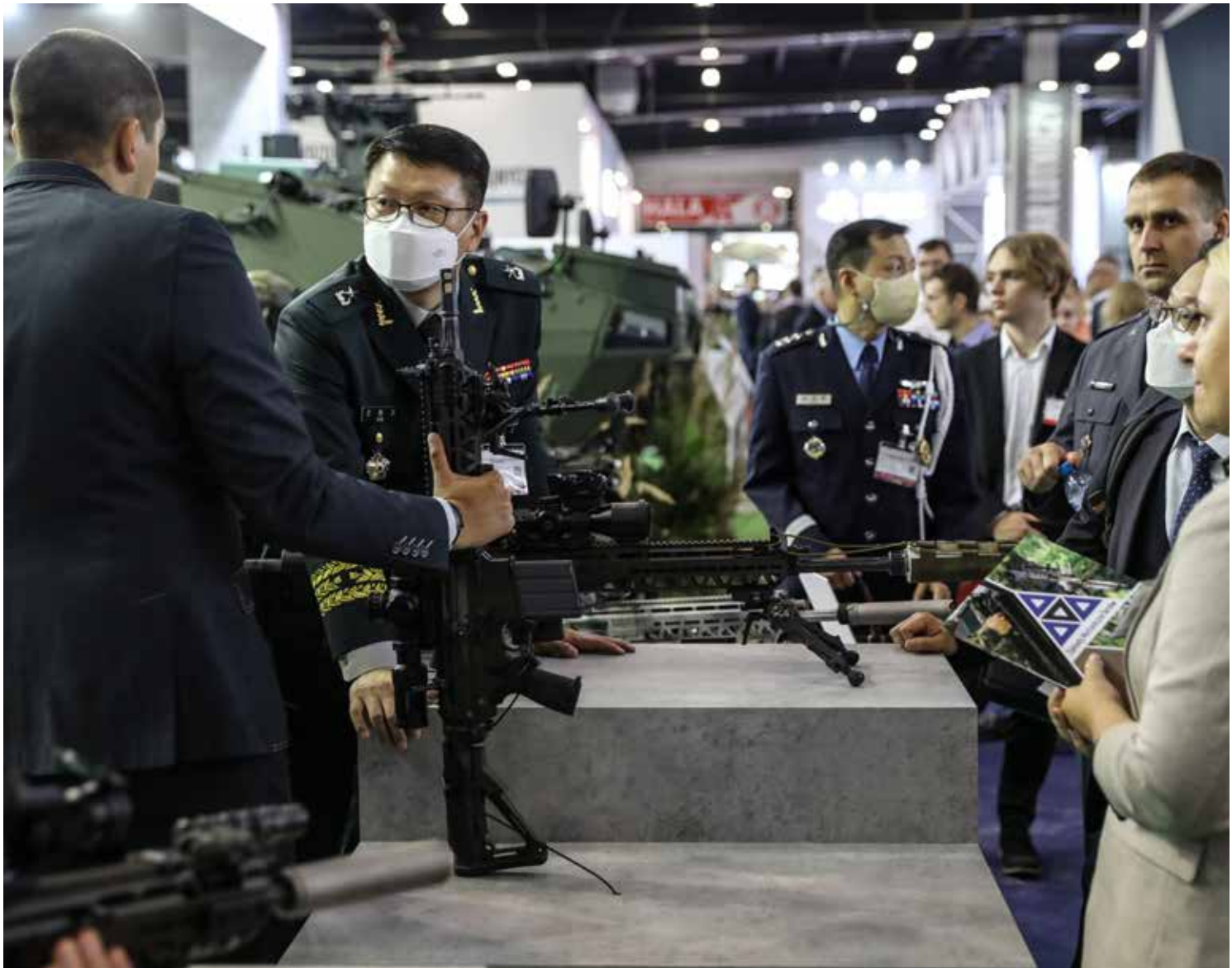
The Dronehub-Tytrax ITWL autonomous drone system docking station acts as a hangar and charger for the Tytrax drone.

visitors. An impressive exhibition that featured cutting-edge solutions for the army, both equipment and systems. More than 30 conferences and seminars were held within the scope of the expo.

This year's show hosted 34 attaché, including the US Deputy Military Attaché Major Elizabeth L. Evans. This year's show saw the largest presence of diplomatic corps representatives attending in five years. MSPO hosted official foreign delegations from 14 countries, including the United States, the United Kingdom, the Czech Republic, Hungary, France, Korea, Norway, Ukraine, Estonia, Georgia, Italy, Lithuania, Spain, the United Arab Emirates and diplomatic corps from 17 countries; Australia, Belarus, Bulgaria, Germany, Indonesia, Libya, Nigeria, Palestine, Qatar, Turkey, Austria,

The Polish-made MZN-1 modular night vision set from PCO was unveiled at MSPO 2021.

SHOW REPORT: MSPO



The Polish defense manufacturer Zakłady Mechaniczne Tarnów S.A. was present at MSPO 2021.

Morocco, South Korea, Pakistan, Italy, the United Kingdom and the United States. Three hundred journalists from Poland and abroad offered media coverage. The MSPO's presentation included the traditional display of the Polish military: the Armed Forces Exhibition held this year under the banner of "Endure-Control-Defeat".

President of the Republic of Poland, Andrzej Duda also attended the expo. Mariusz Błaszczak - the Minister of National Defence, formally opened the show. The head of the National Security Bureau, Paweł Soloch, and his deputy, Maj. Gen. Andrzej Reudowicz visited MSPO. There were also representatives of uniformed services

The BIZON autonomous vehicle, developed by the Air Force Institute of Technology and the Dobrowolski Sp. company, had its premiere.

MSPO 2021 hosted 400 companies from 27 countries and 11,000 visitors from around the world.

including Maj. Gen. Dariusz Łukowski, Director of the Armed Forces Supervision Department at the National Security Bureau, Przemysław Funiok, Marek Pasionek and Andrzej Pozorski, Deputy Prosecutors General, Gen. Rajmund Andrzejczak, Chief of the General Staff of the Polish Armed Forces, and many others.

The Armament Inspectorate of the Ministry of National Defence and the Polish Armaments Group concluded a framework agreement on delivering the **Narew** - a short-range air defense system. President Andrzej Duda emphasised that it has been the most extensive and most complicated contract in the history of the Polish armed forces. The contract is worth, "tens of billions of PLN earmarked for almost 400 launchers," said Andrzej

FB Radom's MSBS GROT modal assault rifle on display.

SHOW REPORT: MSPO

Dynamit Nobel Defence showed their RGW 90 shoulder-launched, multi-purpose weapon system.

Mochoń, president of the board of Targi Kielce, during the Defender awarding ceremony.

Mariusz Błaszczak, the Minister of National Defence, who also partook in the opening ceremony, said, "Let me start by saying that MSPO in Kielce is a strong brand, a leading Polish brand. This is already the 29th trade show; it has always been and will be a significant event for the defense industry. As the MOD, I find it my obligation to create the best conditions for military services, for soldiers, to provide the best equipment. This is what MSPO is for."

Innovations and premieres

The expo booths were packed with the latest-generation equipment. Lockheed Martin showcased a 1:1 mock-up of its **F-35 Lightning II** combat aircraft; Targi Kielce had already hosted this impressive machine at the 27th MSPO in 2019. The **M1A2 Abrams** tank was also an attention-catcher at this year's show. This reliable and robust combat vehicle has already proven itself in conflict zones, the front-lines of the Middle East, and in the distant corners of Asia. The third-generation tank showcased at MSPO is still considered one of the best, if not the best, tank in the world.

The **BIZON** autonomous vehicle premiered at MSPO. BIZON is the fruit of a joint work of the Air Force Institute of Technology (ITWL) and the Dobrowolski LLC. The 3-ton vehicle will be used for continuous testing of the load-bearing capacity of natural airport pavement and for monitoring the pavement's functional elements condition (EFL).

One of the products presented for the first time at the International Defence Industry Exhibition was the **Pilica** system, recently used by the Polish army. The Pilica anti-aircraft missile and artillery system, in service since December 2020, is designed to fight low-flying, water-borne, and lightly armoured targets. The Logistics Training Centre presented a driving simulator designed to train drivers. A Leopard 2 tank crew displayed a tactical simulator, as well.

Essential Contracts and Pivotal Agreements

Polska Grupa Zbrojeniowa (PGZ SA) in cooperation with **Nammo**, one of the world's leading ammunition manufacturers, will serve the Polish Armed Forces. **PCO SA** celebrates its 45th anniversary. The company

International Defense and Aerospace Group's display at MSPO included an American MD 500 reconnaissance and attack helicopter.

has concluded two important agreements regarding expansion into foreign markets; **WZL-2** has made further steps towards developing F-16 aircraft servicing capabilities, and **Military Electronic Works SA** has created a consortium for the delivery of equipment for Poland's Wisła air and missile defense system.

The 29th International Defence Industry Exhibition witnessed the official signing of a letter of intent to confirm the cooperation between the **Polish Armaments Group** and **Targi Kielce**.

Awards and Distinctions

The MSPO included a gala commemorating the ninth anniversary of the State Security Leader National Competition. The competition awards the Proud Veteran statuette and is presented by the Association of Injured and Victims on Missions Outside the Country. The award was presented to Huta Stalowa Wola S.A steelworks. Also taking place at the event was the Blue Ribbon award ceremony. The Blue Ribbon award symbolizes and strengthens cooperation between Polish enterprises and displays appreciation for reliable and robust business partners. This award was presented to Targi Kielce.

However, this is not the only distinction the Kielce exhibition and congress centre has earned. The celebration of the 45th anniversary of the PCO offered the opportunity to recognize Andrzej Mochoń Ph.D., who received a token of recognition for his services for PCO SA.

Uniformed secondary school students gathered at the International Defence Industry Exhibition for an official roll-call headed by the Minister of National Defense, Mariusz Błaszak. During the ceremony the Minister of National Defense recognised the winner of this year's Polish Army knowledge competition, the Military Extra-Class. The competition's winners were John Paul II Technical and Service Schools Ensemble in Tarnowskie Góry, the Sybirak School Complex No. 2 in Nowy Sącz, the Vocational Training Centre School Complex in Rybnik,

SHOW REPORT: MSPO

A Blackhawk helicopter on display in search and rescue configuration.

and Cyprian Kamil Norwid Secondary School No. 2 in Stargard.

One of the highlights of the MSPO agenda is the Defender Gala; this award ceremony honors the companies and products presented at the fair.

The following awards were presented: Special Awards of the President of Targi Kielce Management Board, Special distinction of the MSPO Programme Board, awards and distinctions of the Inspectorate of Support for the Armed Forces, Main Award of the General Commander of the Armed Forces, and DEFENDER statuettes.

The Minister of Development, Labour and Technology also presented special accolades in the Best Polish Armaments Expert category to WB Electronics SA.

The award of the Minister of National Defence, presented in the form of a sabre, was given to the ARCHER Arms Factory from Radom.

The President's Award, granted for the product which best serves the purpose of the RP Armed Forces soldiers' safety enhancement, was presented to Stalowa Wola Steelworks SA, WB Electronics SA, and Rosomak SA for the artillery reconnaissance vehicle built on the KTO Rosomak platform.

The Defender gala was also an occasion to celebrate the anniversaries of the following companies: Griffin Group / Defence (30th anniversary), PCO (45th anniversary), Military University of Technology (70th anniversary), PZL-Świdnik Communication Equipment Factory (70th anniversary), Military Institute of Armament Technology (95th anniversary), Łukasiewicz Research Network (95th anniversary), Polska Zbrojna Magazine (100th anniversary).

The upcoming 30th MSPO will be held next year, though the dates are yet to be determined. We look forward to seeing you.The upcoming 30th MSPO will be held next year, though the dates are yet to be determined. We look forward to seeing you. SADJ

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CHIPOTLE
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A shortened "Krinkov" AK-style rifle in Yemen.

Kalashnikov & G3 Modifications on the Yemeni Market

By Miles Vining | Photos Armament Research Services (ARES)

Generally, there is only one city that is known to modify small arms extensively in Yemen: Dhamar, a Houthi-controlled city in south-western Yemen. Many of these modifications are done to shorten barrels, install side-folding stocks, or modernize older rifles.

MODERN FIREARMS

A Soviet AKS-74U self-loading rifle, for comparison.

AMD-65 to AKS-74U

At first glance, this rifle could easily be mistaken for an AKS-74U. However, a closer look at the selector markings indicates that this weapon started life as a Hungarian AMD-65 variant; note the selector marking with the infinity symbol for the automatic position, and the "1" digit for semi-automatic. Another clue is the handguards, which appear to be wedged together too tightly, something we don't see on post-1986 AKS-74U models or Bul-

GUN WIKI

A Hungarian AMD-65 self-loading rifle.

garian copies. The rivets don't match up either, and the rear of the receiver appears reworked to accommodate the side-folding "triangle" stock of the AKS-74U.

DDR MPiKM to AKS-74U

This is an example of an East German MPiK-series self-loading rifle modified to appear as though it were an AKS-74U. The rifle is shown here fitted with a 7.62×39mm magazine instead of a 5.45×39mm magazine, which is a dead giveaway. So is the oddly configured and brightly silver-colored stock latch. Interestingly, the stock latches are similar to KpK AKS-74U rifles in Pakistan in that the rifle can appear very close to the original, but the latch tends to be a giveaway of a fabrication.

South African R2 Conversions

These G3 rifles pose an interesting Yemeni phenomenon, with their origins in several countries. The base rifles themselves are Portuguese license-produced copies of the Heckler & Koch G3, as made by the FMP arms factory in Portugal. They were later sold to South Africa where they were adopted as the R2 service rifle. However, due to issues with the Portuguese-made handguards, South Africa replaced them with a modified design purchased from Choate Machine & Tool in the United States.

Some of these US-made handguards have been cut short to fit cut-down barrels seen on some of these modified rifles. This is important to consider because the original Portuguese models were full-length rifle variants. Yemeni makers often fill in the selector markings with a finish of yellow color, and sometimes add their own original mark-

After the conversion.

The trunnion of the converted rifle.

A Portuguese FMP G3 with South African R2 handguards. Note the handguard is shortened to fit the carbine length barrel on this modified weapon.

ings to the receivers.

G3 Cosmetic Modifications

Amongst the most striking modifications observed in Yemen are the cosmetic modifications made to G3 rifles. In particular, visually distinctive muzzle devices and handguards have been the cause for much discussion amongst analysts. Some speculate the oversized muzzle devices and cylindrical handguards— both of a similar diameter and color— together constitute suppressors, or even rifle grenade launching devices. In fact, confidential sources in Yemen have indicated they are simply aesthetic modifications designed to increase the value of the weapon.

Anti-Materiel Rifle Conversion

Other strange conversions can be found on the Yemeni arms market, as well. Pictured below is a

FORGOTTEN WEAPONS

South African R2 handguard produced in the US by Choate Machine & Tool, *top*, and standard Portuguese G3 handguard, *bottom*.

A Portuguese FMP G3 with South African R2 handguards. Note the colored selector markings and additional markings "Al Marnz", possibly the name of the gunsmith or conversion.

A Houthi fighter armed with a G3-type self-loading rifle.

A G3-type self-loading rifle fitted with the visually distinctive cylindrical handguard and oversized muzzle device described. Note also the colored selector markings.

A second example of a G3-type self-loading rifle fitted with the visually distinctive cylindrical handguard and oversized muzzle device.

12.7×108mm craft-produced anti-materiel rifle, allegedly assembled from a range of factory-made components. The receiver is that of an NSV heavy machine gun, as reported by ARES. SADJ

SOURCES

- Armament Research Services (ARES), 2019, Conflict Materiel (CONMAT) database
- McCollum, Ian, 2019, "South African R2 and its Special Furniture" Forgotten Weapons

* * *

This article originally appeared at Silah Report, a project of Armament Research Services (ARES) monitoring arms and munitions developments in the Middle East, North Africa, and Central Asia. More original material is available at: www.silahreport.com.

NSV-based anti-materiel rifle.

J. MONTES

Marine Ford F-250 gun truck. The Support Logistics Command (CALFA) has transformed several of these gun trucks. The latest model carries an M2HB in place of the M60D on top of the cabin, a side-mounted minigun and an M60D facing backward.

Salvadoran Naval Task Force "Tridente"

By Julio A. Montes

In November of 2016, the 75 naval elements that make up the Salvadoran Naval Task Force "Tridente" received the "Mare Nostrum" Medal for their tremendous achievements. This naval commando was organized under the leadership of then Captain René Francis Merino Monroy on October of 2015, and it was Merino who, during the ceremonies, reminded the attendees that in 2014 the El Salvador Naval Force (FNES) had seized 922kg of cocaine, but in 2015, after the creation of the Trident Naval Task Force (FTNT), the FNES had captured 2,851kg of the drug.

Tridente turned up to be a very aggressive force. From January to September of 2016, FTNT seized another 7,465kg of cocaine, which became a historic record for the country. In 2017

J. MONTES

Tridente commandos in formation. The Salvadoran Marines would like M40A1 precision rifles and a couple of Barrett rifles as well.

there was another successful fishing operation, taking 7.2 tons of cocaine, 740kg of marijuana and 9kg of heroin. In May of 2018, the FNES intercepted a boat 290 nautical miles from Punta Remedios, Sonsonate department, with 947 kilograms of cocaine. On September 14, 2018, a Low-Profile Vessel (LPV - semi-submersible), was intercepted 85 nautical miles south of Punta Remedios, Acajutla, Sonsonate with 575kg of cocaine. In October, another load was intercepted 455 nautical miles south off Acajutla, followed by another one with a load of 1,681kg of cocaine, intercepted 231 nautical miles south of Punta Remedios, Acajutla; and on December 12, 2018, FTNT seized another 1,313kg of cocaine on the high seas, more than 416 kilometers southwest of the coastal town of Acajutla in the western department of Sonsonate.

In 2016, Admiral Kurt W. Tidd, commander of SOUTHCOM at the time, assured that additional assistance would be given to the FNES. Following this, the U.S. has delivered up to

FNES emblem.

eight Boston Whaler BW370 Justices (PA-10 / PA-17), four SAFE Defenders (PA-06 / PA-09), and five BW Guardians (LR1 / LR5). However, these are relatively short-range naval interceptors, lacking the accommodations necessary for long ocean patrols. Despite limited resources, the FNES managed to operate two converted 65ft patrol boats, PM-13 and PM-14, as ocean-going motherships for two interceptors, each operating an FTNT team. As a result, by 2019, the fleet had been decimated.

Neglected for Years

Until recently, the Salvadoran coast was a haven for drug runners. The Navy was successful in turning the tide, but it cannot do so indefinitely with meager resources. The Navy cannot fight against the drug trafficking, maritime smuggling, piracy, fishing protection, maritime environmental protection, search & rescue and maritime surveillance in general on the high seas.

El Salvador is located in the middle of the Central American Isthmus with a territorial extension of 21,042km² and protects 577.5km of border, limited to the north and northeast with Hondu-

Marine Battalion emblem.

ras (374.5 km of border); in the east and southeast with the Fonseca Gulf, to the south with the Pacific Ocean, and to the west and northwest with Guatemala (203 km of border). El Salvador claims 12 nautical miles of maritime territory, 24 nautical miles of continuous coastal zone with 328.83 kilometers of coastline and beaches, and exercises sovereignty and jurisdiction over the sea, the subsoil and the seabed to a distance of 200 nautical miles counted from the lowest tide line on the coast of the Pacific Ocean—a situation that translates into an estimated 88,000km² of territorial waters. This is a huge area of responsibility considering that the FNES has only three fully-operational cutters: PM-8, PM-13 and PM-14, which at full speed travel no more than 10 knots.

In November of 2019, Merino Monroy, as recently appointed Defense Minister, requested $13 million to purchase the first oceanic patrol vessel. The request caused an uproar in the Salvadoran legislature. Rodolfo Parker, a Salvadoran Congressman of

FTNT emblem.

J. MONTES

With a minigun on a Boston Whaler

the Christian Democratic Party (PDC) stated[1] "a ship has nothing to do with gangs," adding "we will not give toys to Minister Monroy." The comments of the deputy would typify the political indifference to providing the necessary assets to exercise control over territorial sea, maritime environment, fishing banks, treasury and others. It is typical of the lack of political will to attend to the sea, an indifference that has been present since the Navy was founded in 1950. The first naval base, which operated from 1949 to 1984, shared the same artisan dock of Pueblo Viejo, within La Union City. 1975 was the last time the government afforded vessels to the Navy, when it acquired three Camcraft crew-boats Model 1973 delivered between 1974 and 1975 as GC6, GC7 and GC8. These remain today as maritime patrol boats PM-6, PM-7 and PM-8.

It was so small and restricted that

J. MONTES

The Salvadoran Marines are still armed with the long and obsolete M60 machine gun. The CALFA could transform it to the M60E6 with kits from U.S. Ordnance.

the American advisors were alarmed in 1980. With U.S. assistance, a new Naval Base of La Unión was established at Punta Ruca, just outside La Union City. U.S. advisers were appalled by the dismal conditions and materials, so they continued to provide funds for the Salvadoran Navy while the local government simply forgot about it. The FNES operated four patrol boats in the early 1981: one 65-ft Sewart patrol boat (GC5), supplied by the U.S. in 1967, and the three aforementioned Camcraft crew boats (GC6, GC7 and GC8). The boats had two or three Browning M3 machine guns, but lacked even navigation equipment, so they were overhauled and refitted in the U.S. in 1985. The U.S. delivered GC9 and GC10 in 1984, followed by GC11 in 1985. GC5 was lost late in the 1980s due to drifting against the rocks after engine failure during a night patrol, and GC9 (a 40-footer) was soon discarded after delivery due to constant engine failures. PM-10 and PM-11 remain, but have been in need of a SLEP (Service Life Extension Program) since 2005.

J. MONTES

A Naval Infantryman provides security with an M4 carbine to the parading FTNT elements.

The governmental indifference resulted in Honduras establishing a military presence in Conejo Island in 1986, a small piece of land now in dispute in the Fonseca Gulf. As the internal conflict evolved, the Navy estab-

The Naval commando company became part of the GOE - Special Forces Command in 1994. Here are some of them with MP5 submachine guns.

J. MONTES

lished the Naval Commando battalion with assistance from the U.S. SEALs, and with assistance from the USMC, the "12 of October" Naval Infantry Battalion (BIM).

The post-conflict era saw the change of denomination from Salvadoran Navy to Naval Force of El Salvador (FNES) with the establishment of the Naval General Staff, but the force took a toll with the reduction of its assets and the Naval Commando Battalion to a single company of 93 men, and its transfer under the Special Operations Group (GOE) within the Special Forces Command. The BIM was also reduced to a 120 naval fusilier company, in charge of base and installation security. Of course, the central government forgot again about maintaining whatever had survived the conflict against the FMLN.

Salvadoran naval officials tried to modernize the service towards the end of the 1990s, looking into purchasing two Spaniards R-101, but that effort failed so they looked into other equipment, such as the Service Patrol Boat

FNES

An U.S. Navy Cyclone-class PC at La Union Naval Base, alongside a PM-7.

U.S. DOD, DANIEL BARKER

Chilean Sa'ar IV boats that could become available soon upon retirement. The Sa'ar boats could be converted to OPV by rearranging the stern to allow a landing deck for a small light helicopter and/or drone.

J. MONTES

20mm MK-67 on a Salvadoran cutter. The new boat could be equipped with 25mm MK-38 Mod.2 from U.S. Navy or USCG excess.

FNES

A PM-13 and two Boston Whalers.

(LSG) being built in those days by the ASMAR (Astilleros y Maestranzas de la Armada) shipyard in Talcahuano, Chile, but it amounted to nothing. Israel's IMI appears to have offered three D'vora class boats, two to be delivered, and one to be built in-country for $18 million, but no. Damen Shipyards is said to have showed interest in taking over the installations of the failed La Union Port, and presented a package that included two DSPa-4207s for $57 million. The U.S. attempted to kick off interest for the FNES by transferring a bunch of decommissioned USCG vessels, to include an elderly Balsam class buoy tender (BL01 Arce) built in 1943, followed by a Point class boat (PM-12) and four 44'MLB. These did not last in service due to the lack of funds for maintenance. The U.S. had delivered one LCM-6 (LD-01) that never worked correctly and suffered an accidental explosion, and two new LCM-8s (LD-02 & LD-03); a third used LCM-8 arrived around 1994 (LD-04), and a fourth (LD-05) around 2008, along with some ten 18ft airboats.

Around 2005, Taiwan offered to transfer two D'vora class boats for free, but president Saca's administration intervened and Taiwan is said to have funneled funds directly to the rightist ARENA party instead. This was in addition—in fact a few years after—to millions that ARENA had diverted from Taiwan's assistance to Salvadoran victims.

NCPV

Nevertheless, on July 22, 2021, the FNES received its new PM-15 patrol boat, a modified DSPa-2606 boat. The ship is one of thirteen Near Coastal Patrol Vessels (NCPVs)—a strange name given to a program designed by the U.S. to supply modern Coast Guard boats to allies in the Caribbean and Central America. The U.S. Navy contract to Metal Shark is said to be worth $54 million, and the boats are being distributed as the Defiant-85 class and as part of Foreign Military Sales (FMS) in a program where the U.S. assimilates $4.2 million and the recipient pays $1.8 million, for a unit cost of $6 million. As a comparison, Venezuela produced the PG-51 Págalo, a DSPa-2606 variant, between 2007 and 2008 at a cost of €4.5 million[2, 3], representing today $5,297,085, but equivalent to $7 million in 2008. Hence, some sources have erroneously used this value ($5.2 million) to reflect the cost of the NCPV.

SALVADORAN NAVY

The newest gunboat.

Rear-Admiral Exón Oswaldo Ascencio Albeño, FNES Commander, was allowed to come on board the PM-15. The 85-Defiant boat is made of all welded aluminum monohull, measuring 87' in length and 19' 6" beam, and employing a deep "V" fully welded aluminum hull with a sloping bow. It is similar in design and concept to the USCG Marine Protector, but instead of two MTU 8V 396 TE94s engines it is powered by two Caterpillar 1,600hp C32 engines. The Salvadoran Navy has been allotted one but needs at least one, and ideally two, more boats.

In addition, the Navy has implemented a program to recover as many vessels as possible. Among others, the Salvadoran Navy had requested four additional LCM-8s in 2008, but none was available for transfer. However, with the 2020 announcement that the U.S. Army Transportation Corps is discharging those vessels as excess, a new request was recommended. The Salvadoran Navy is interested in at least one Logistics Support Vessels (LSV) which can be used with great effect to support the Salvadoran islands in the Fonseca gulf, and the coast, as well as a logistical vessel to support oceanic patrols.

An ocean-going patrol vessel is also needed. The defense minister, Vice-Admiral René Merino Monroy, stated that he is looking for an offshore patrol vessel (OPV) between 50 and 78 meters in length and similar in concept to the OPV-62M of Honduras. However, the OPV-62M acquired by Honduras has an official cost of $54 million, and the OPV-80 models in use by Colombia and Chile have a price tag between $60 million and $80 million.

The amount requested by FNES suggests that the Salvadorans are looking for something much, much simpler than an OPV-62M. However, the Damen 5009 runs for about $13 million, and modified as OPV, it has internal arrangements for its quasi-military use, and could mount a 25mm BAE MK-38 Mod. 2 (perhaps from the U.S. Navy or U.S. Coast Guard excess) at bow accepting that armed patrol would be a secondary task. The Colombian Cotecmar Shipyard, on the other hand, offered its CPV-46 and other products in July of 2021.

The decommissioning of the Cyclone-class patrol craft (PC) from the U.S. Navy provides an additional potential source for one, two or even three offshore patrol vessels for the FNES. The PC could be modified with a small landing deck for a light helicopter in place of the armament at stern while keeping its 25mm MK 38 autocannon, two 12.7mm caliber machine guns, and two 7.62mm M240B machine guns. The Cyclone measures 57m (179ft) in length and a beam of 7.6m (25ft). Its four Paxman 16RP200-1-CM diesel engines provide for speeds up to 35 knots and a range of 2,000 to 2,500 nautical miles at 12 knots.

Restoration

We had the chance to interview now Vice-Admiral Merino just before his appointment as Minister of Defense by president Nayib Bukele in early 2019. Admiral Monroy expressed then that he would welcome Chilean naval assistance since he attended the Chilean Naval Academy "Arturo Prat" at Valparaíso, from February 1987 to December 1989. He disclosed that at one point the FNES was interested in acquiring the former Tiger class missile boats decommissioned in Chile.

Effectively, a similar prospect to the Cyclones could be provided by three Chilean Sa'ar IVs upon retirement. If the Salvadorans would be able to acquire the Sa'ar IVs, they would need to be refurbished and modified much in the same way as proposed earlier in this article, retaining a gun turret forward and exchanging the stern missile batteries and gun turret for davit cranes and naval interceptors and a landing deck. However, these vessels were built in the early 1970s, so they are considerably older than the Cyclones. Nevertheless, the proposed OPV conversion concept has been applied to the modern OPV-58M from ISL which uses the same Sa'ar IV designed hull, and South Africa applied something

President Bukele and Vice-Admiral Merino passing review of the cadets from El Salvadore Military Academy.

J. MONTES

similar with its Warrior-Strike Boats.

The FTNT received training from October 30, 2017 to February 1, 2018 by elements from the U.S. Navy Naval Special Warfare Command, SEAL Team 2 and the Special Boat Team No. 22. Vice-Admiral Merino Monroy is open to allow a semi-permanent presence of the U.S. SEALs and a U.S. Marine Company around La Union Naval Base to hone the skills of his men, and to exchange skills. Merino worked closely with U.S. counterparts while serving as a company commander with the XI Cuscatlán Battalion in Iraq between June of 2008 and February of 2009.

Given the outstanding FNES performance, in mid-2019 it was announced that MARFORSOUTH commander, USMC Major General Michael F. Fahey III, had promised training to BIM Commander, Lieutenant Commander David Jiménez[4]. As it happens, the battalion was restored to full strength in October of 2008, and today, the BIM deploys a company in support of Neptune Task Force, a rapid intervention anti-gang team, operating at Puerto El Triunfo, Usulután, and its elements feed the ranks of FTNT. The Marines and FTNT are well equipped with new M4 carbines, but they still soldier on with the M60 machine gun. This weapon also needs an upgrade, and perhaps the M60E6 could do the trick.

One complaint to us from the Marines has been that their few M24 sniper rifles were turned over the Special Forces Command, and the Marines would like replacements. They also would do with a few Barrett anti-material rifles. While the GOE uses the RPG-7, the Marines could be equipped with either the C-90 Instalaza, which is already in inventory, or new AirTronic USA RPGs. The Logistical Support Command (CALFA) has provided a single Ford F-250 gun truck, modified with two M60D machine gun pintle mounts. More are needed to order to motorize the single battalion. In fact, the Salvadorans should follow the path of Guatemala and Honduras and create a full Marine brigade. In fact, the FNES should expand and divide into a Naval Force and a Coast Guard Command, with new installations along the expanding port of Acajutla.

Requirements

The United Nations Office on Drugs and Crime (UNODC), in its publication titled *Country Strategy for Institutional Strengthening in Interdiction of Drugs and Chemical Precursors - El Salvador*[5], stated that among the country's needs, the FNES requires to strengthen the capacity to operate offshore above the 50 nautical miles through the endowment of technological, communication and location. It also states the need to strengthen the capacity of the Salvadoran Air Force (FAS), to operate on the high seas or international waters, considering the endowment of technology and aerial means with equipment navigation, communication, location for air-maritime and land surveillance.

This was highlighted again in late July 2021, when a Salvadoran cutter seized 1.4 tons of drugs, valued at 35 million dollars, at 490 nautical miles (907km) from the Salvadoran coast. The cutter had been diverted from another seizure realized at 319 nautical miles (575km) south of Punta Remedios, where a vessel had been intercepted with 585kg of cocaine, with a value of $14.6 million. SADJ

FOOTNOTES

1. Asamblea ha aprobado más de $775 millones para Seguridad, **ensalmador.com**
2. El presidente Chávez abandera el primer buque de guerra construido en Venezuela, **soitu.es3**
3. Analizan adquisición de un guardacostas en Venezuela, **elnuevodiario.com**
4. MARFORSOUTH Trains Salvadoran Marine Battalion, **dialogo-americas.com**
5. Estrategia país para el Fortalecimiento Institucional en la Interdicción de Drogas y Precursores Químicos – El Salvador, United Nations Office on Drugs and Crime

ARES CONMAT DATABASE

One of many 12 gauge pump-action Mossberg shotguns in the dataset, in this case a Model 500 with pistol grip, short barrel, Picatinny top rail, 6 o'clock railed pump grip fitted with hand-stop accessories, a side-saddle shell holder, fiber optic front sight and laser aiming unit.

The Online Trade in Illicit Small Arms in Venezuela, Part 2

By Pedro Pérez, Jonathan Ferguson & N.R. Jenzen-Jones

Introduction

Within Venezuela at the time of writing, the illicit arms trade is generally conceived of as two parallel and interrelated markets: the "black" and the "grey." In the Venezuelan context, "black market" activities are those that are not only illegal at present, but have always been illegal. This includes the purchase of all light weapons and munitions. Particularly popular are hand grenades, which are used in attacks by criminal groups across Venezuela. The so-called "grey market" exists primarily to cater to participants who hold, or have formerly held, the legal authority to possess firearms, and is comprised primarily of sports shooters, current and former military and law enforcement personnel, hunters and civilians who held firearms permits for self-defense. Despite this, a limited amount of crossover between the markets exists, and there are small numbers of criminals operating in the grey market. Whilst strictly illegal, grey market activities are generally self-policed, relying in many ways on an "old boys' network" of informally-trusted individuals that generally requires a recommendation from another participant to access. The term "grey market" is used herein to refer solely to the trade in firearms and ammunition by formerly-licensed individuals and the quasi-legal trades associated with that. Whilst this report is primarily built upon grey market data, it can be difficult to distinguish the two trades, and they are treated collectively within the dataset.

The grey market existed prior to

A personal home-defense setup shared with ARES by a confidential source in Venezuela. It comprises a Level III ballistic vest, ballistic helmet and chest rig with various pouches and carriers for pistol magazines, shotgun cartridges, medical equipment and a handgun. A Remington 870 series shotgun, Beretta 92 series handgun, riot control agent (CS) grenade, and a fixed-blade knife are carried. Note that the shotgun, pistol and helmet are all fitted with white-light illumination devices. The source told ARES that combination of 00 buckshot and slugs are carried for the shotgun. Note that some potentially identifying features have been redacted.

the ban, but was primarily oriented towards the sale and purchase of ammunition, in order to skirt the monthly limit (50 cartridges per caliber registered) placed on permit holders prior to 2012. This limit presented a problem for some sport shooters, for example, whose matches would require significantly more ammunition in order to compete, as well as additional requirements for training. It was common for gun stores to offer imported ammunition under the table; this was usually sold at a higher price than that manufactured locally by the *Compañía Anónima Venezolana de Industrias Militares* (CAVIM). These transactions were typically conducted only with cash, so as not to generate a digital record of the sale. A significant quantity of the ammunition sold under the table were jacketed hollow-point (JHP) cartridges, as this type of ammunition was not produced by CAVIM until the late 2010s.

ARES CONMAT DATABASE

The sole example in the dataset of a Mossberg Maverick 95 bolt-action 12 gauge shotgun.

Interviews and an analysis of contextual information indicate that the vast majority of the trades are conducted for the purposes of self-defence, hunting, or sport shooting (primarily the disciplines of IDPA, IPSC and PPC), although some firearms do end up in criminal hands despite the attempts made by many of the sellers to avoid this. There is very high demand for weapons conducive to concealed carry, particularly in urban areas, such as Caracas. Although self-defense is a primary motivator in the more rural areas of the country, there is a higher demand for long guns in those areas. The fact that this study primarily records trades in Caracas accounts for the disproportionately high number of handguns contained within the dataset, as compared to the estimated proportion such weapons comprise of total Venezuelan small arms holdings. This general preference for handguns in urban areas has been reflected in several other ARES studies of illicit arms markets, including those in Libya, Iraq and Colombia, and distinguishes the threats faced by people in Venezuela from those in countries with ongoing, large-scale conflicts—such as Syria and Yemen—where self-loading rifles are the dominant weapons traded.

There is significant participation from members of the security services within the grey market, and limited participation by some individuals in the black market. Perhaps needless to say, former and current military, intelligence and law enforcement personnel participating in and benefitting from the grey market are willing to overlook the illicit nature of these activities. Regardless of their personal background, many participants in the grey market are able to use their security

ARES CONMAT DATABASE

A Benelli M3 Super 90 dual-mode (pump-action and semiautomatic) shotgun, fitted with a Streamlight TLR-2 tactical light with integrated red aiming laser, on a CDM gear Picatinny rail mount, TacStar side-saddle shell carrier, and Blackhawk! sling.

ARES CONMAT DATABASE

A Russian Baikal IZH-81KM 12 gauge pump-action shotgun fed from detachable box magazines.

contacts to access databases maintained by military or law enforcement units. Sometimes, security forces' participation in the grey market crosses into "black" activities. In some cases, for example, firearms which are falsely reported as lost by police or military personnel—or stolen outright—are then offered by these individuals for sale on the black market.

This month's report continues on from last month's, which covered self-loading pistols and self-loading rifles, by looking at other types of small arms traded on the black market in Venezuela.

Shotguns

Shotguns represented 9% of all firearms listed. All of the samples in the dataset were chambered for the commonly available 12 gauge cartridge, and 91% of examples were pump-action weapons. Manually operated shotguns of sufficient overall and barrel length are perhaps the most readily available and easily exported/imported of all firearms worldwide. Despite this, a disproportionate 68% of all the shotguns are from a single U.S. manufacturer, Mossberg. Many of these are extensively accessorized and are available in a range of models/configurations. Short barrels and "tactical" configurations are preferred and traditional full-length unadorned examples (such as might have an obvious sporting purpose) are relatively rare. A more unusual Mossberg 12 gauge shotgun noted was the Maverick 95, a bolt action design with vertically feeding fixed box magazine housed in a distinctive "bellied" stock (in this case with an aftermarket camouflage finish).

Remington 870 (pump) and 1100 (self-loading) models are also represented in the dataset, albeit in small quantities. The 870 models follow the home/self-defense configurations of the Mossberg guns, but the two 1100 series guns recorded were traditional full-length examples without accessories. Other manufacturers include the Italian firm Benelli. A confidential source in Venezuela indicated that Mossberg and Remington guns had the widest brand name recognition within the local firearms community, but confirmed that Mossberg examples were far easier to come by. Another source indicated to ARES that many people rely on shotguns for home defense in Caracas, and shared a photo of their personal home-defense setup with ARES.

Submachine Guns & Pistol Caliber Carbines

Submachine guns (SMGs) and their self-loading-only counterparts (sometimes known as "pistol caliber carbines") were the least common type of firearm in the ARES dataset, comprising just 2% overall. This follows global trends, in which such weapons remain relatively uncommon, being bulkier and more expensive than handguns, but less effective in most respects than other shoulder-fired weapons chambering "rifle caliber" ammunition, such as 5.56x45mm. Another key factor is that these types of firearms have never been legal for civilians to own in Venezuela. There is a very high probability that all of the examples listed were stolen from government armories or smuggled in from the United States. Even semiautomatic-only "pistol caliber carbines" are rare: around 80% of all the examples in the dataset were select-fire. One of the semiautomatic-only weapons was a U.S. "pistol" variant of the exotic-looking KRISS Vector SMG

ARES CONMAT DATABASE

One of only two semiautomatic-only SMG/"pistol caliber carbine" firearms in the dataset; the exotic-looking KRISS Vector, here with short barrel and arm brace.

(pictured), the other a CZ Scorpion Evo. In terms of cartridge types, all but two examples are chambered for 9x19mm (the remaining two being in .380 ACP and 5.7x28mm).

Two examples each of the well-regarded IMI (now IWI) UZI and HK MP5 (in "A3" variant form) type SMGs were identified. However, it was not possible to identify the manufacturer of any of the UZI models, as Venezuela is known to have purchased these from multiple sources. Both the UZI and the MP5 have been issued to security forces in Venezuela, and are used by Venezuelan investigators as a diagnostic indicator of theft or diversion from security forces' armories. One such stolen UZI was recovered in a police operation of November 21 along with other arms. The MP5 submachine guns were produced in Germany, and a national crest denoting government ownership was visible on one. A single Heckler & Koch SP89—an early "pistol" variant of the MP5 produced in Germany for the U.S. market—was also offered for sale. Other types represented singly were: an IMI Mini UZI, U.S. Military Armament Corporation Ingram M10 (offered with five magazines), U.S. Rock River Arms model LAR-9 AR-15-type SMG and Danish Dansk Industri Syndikat Madsen

ARES CONMAT DATABASE

A Danish Dansk Industri Syndikat Madsen M50 SMG, chambered for 9x19mm.

M50. All of these were chambered for the ubiquitous 9x19mm cartridge.

Perhaps the most significant SMG within the dataset is a single FN Herstal P90 model, chambered for FN's proprietary 5.7x28mm cartridge and offered complete with four magazines. As noted earlier, this is an issue weapon for the FNAB, and should not be confused with the civilian-market PS90, a semiautomatic-only variant with a (U.S.) legally-mandated 16-inch (406mm) barrel. Although a PS90 can be fitted with a shorter barrel, the example pictured here is visibly marked "P90" on its upper receiver and is therefore an original select-fire P90. According to confidential sources—and supported by a forthcoming ARES report—the 5.7x28mm cartridge is difficult to obtain in Venezuela. This may explain why only one of the magazines

The single FN P90 SMG (5.7x28mm) shown in disassembled state with four magazines.

ARES CONMAT DATABASE

displayed with the weapon when it was offered for sale was loaded.

Conclusion

The ARES dataset offers a limited window into the online sale of small arms and ammunition in Venezuela, and is particularly focused on the grey and "grey-adjacent" markets in Caracas. Nonetheless, the available data strongly suggest that the apparently limited pool of typical civilian-owned handguns, rifles and shotguns available prior to imposition of broad legal restrictions in 2012 has become larger and more varied as a result of illegal acquisition, enabled by Venezuela's civil unrest and security issues in general. This is evidenced by the presence of firearms within that dataset that were produced after 2012, and supported by a range of interviews with confidential sources that indicate the illicit import of small arms is ongoing.

Importantly, a relatively limited number of new firearms models have been observed; there is a very strong bias toward a handful of popular makes and models as discussed in this report. The types offered for sale reflect prevailing fashion in local, U.S., and global "gun culture"; the practical and perceived needs of the buyers; and the context of government attempts to restrict civilian ownership of firearms—although it is clear there is a separate group of firearms owners with government connections that may defy this trend. This subset of the firearms-owning community in Venezuela would be a useful focus for further study. Arms have been acquired through both licit and illicit means, both from the black and "grey" markets, and via elements of the Venezuelan government. Diversion from the armories of the military, police and intelligence forces is an important contributing factor, and remains an ongoing issue within Venezuela. This is evidenced in materiel bearing government ownership marks, in the statements of confidential sources and in presence of highly restricted types (e.g., submachine guns). Another key factor in the ongoing supply of arms to Venezuelan markets is the importation of complete weapons and critical components from the United States. This is reflected by the trend toward informal standardization on AR-15-type rifles and Glock pistols—in large part comprising firearms that were recently imported—and the reflection of the broader U.S. gun culture in terms of accessories, customization and desirability. The market is finally supplemented by older firearms that have circulated for years or decades, including ex-Venezuelan military/police handguns, sports shooters' weapons and firearms that one might encounter in civilian hands in most jurisdictions worldwide, such as legacy revolvers, .22 LR caliber rifles and pump-action shotguns.

Finally, the Venezuelan expression of the global trends toward combining craft-production and commercially available components—most notably 80% receivers—with aftermarket parts to create new weapons not subject to government control is of particular interest. This phenomenon is being reflected elsewhere in the region, as early results from ARES investigations in Colombia, Mexico and Brazil show. In addition to underpinning the sales of small arms documented within this report, internet communication enables many of these "DIY" firearms users. Local assemblers and craft-producers of undocumented firearms are able to access the parts and components required to produce weapons, the means to transfer them into the country and the knowledge to assemble them via the internet. They are then able to advertise their wares directly to interested buyers, as well as through the broader online markets described herein. The domestic illicit arms trade in Venezuela is increasingly internet-enabled. SADJ

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This article is adapted from the research report Black & Grey: The Illicit Online Trade of Small Arms in Venezuela *published by Armament Research Services (ARES). For further information on the data gathering methodology and dataset analysis, as well as other original research, see* ***armamenresearch.com.***

M781 versus FCI 40x46mm

"Lesson to the mad scientist – fixing things that are not broken is going to be more difficult."

Building the Better Mousetrap – And Pitching it to Uncle Sam

By Jay Bell

The low velocity 40x46mm grenade training round is something that countless soldiers and civilians shoot each and every day. Soldiers and other security personnel qualify with it on ranges all over the world. Civilians use it on weekends trying to magically land a round in a 55-gallon drum at 300m. The winner gets bragging rights and, in some cases, a cash prize.

This tale is about the attempt to improve standard 40x46mm grenade training ammunition and sell the improved design to the U.S. Army. However, the saga would not be any different if the item in question was a ballpoint pen or a rocket. The process,

and the lessons learned, apply to selling just about any specialized item to the U.S. government.

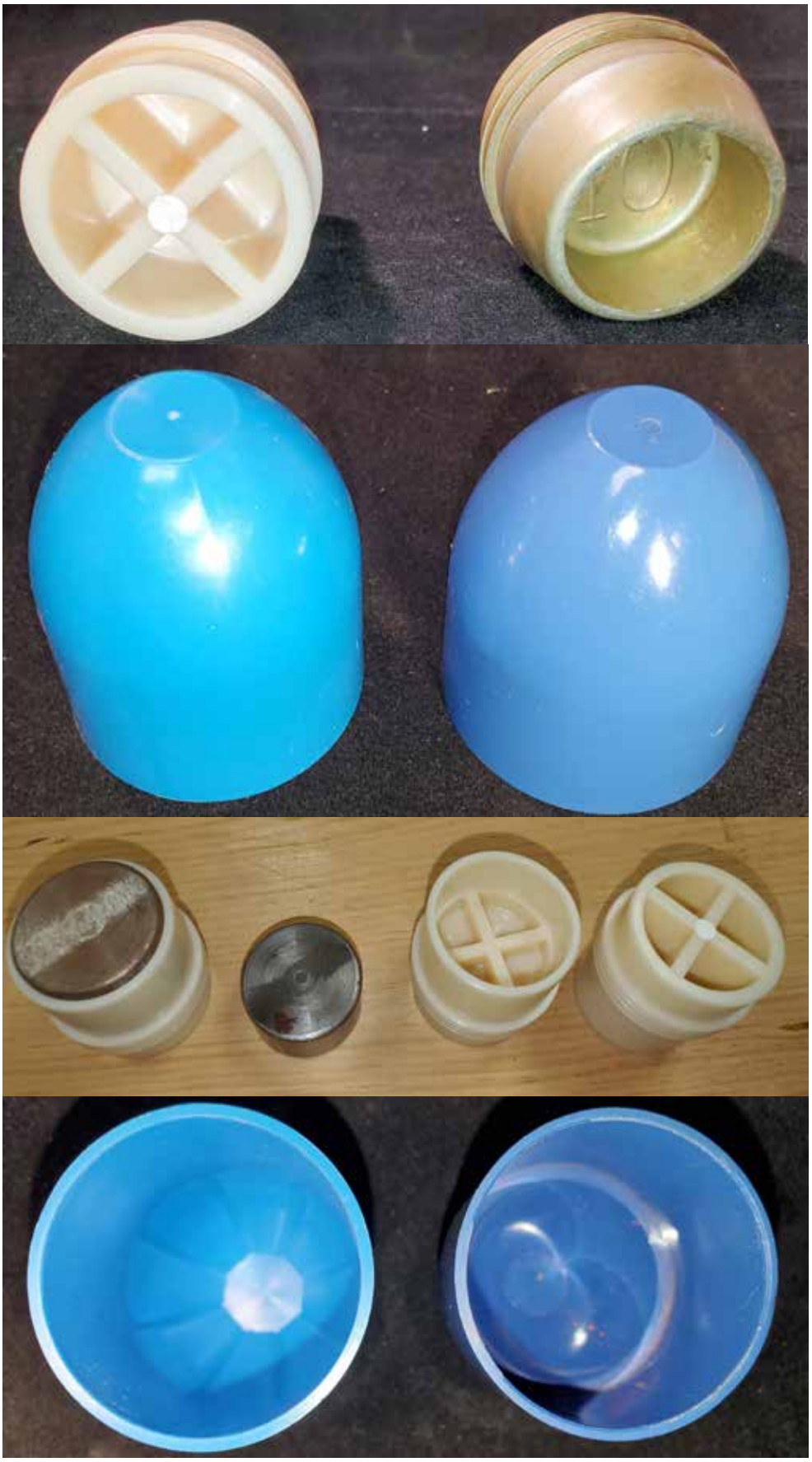
Due to its popularity, fun-factor, and simplicity, many people have toyed with the idea of improving the 40x46mm round. Countless masses think they can improve the mousetrap. However, the realities of this tale serve as a cautionary note for all the engineers, mad scientists, crackpots, and inventors that have an idea on how to improve a product or create an item used by any military or major enterprise. The process is not as simple as it seems.

A lot of my stories highlight the bureaucracy of the U.S. Army, in particular. It's essential to mention that most of the time, the red tape does result in only the best products being provided to our troops. It also prevents questionable designs from ever being introduced to the services. If a million new products are introduced to the U.S. government, probably only a few hundred get selected for initial evaluation. Most fail in short order. Of those few that make it past their initial trial, many fail the mid-tier testing, and nearly all fail in the detailed trials that accompany the rigors of a full Mil-Spec qualification. If the failed product is particularly novel, the government might fund improvements to the design along the way. Even then, some products never pass muster and or go on to be type classified. Only the best-of-the-best make it into the field. Even then, some products in the field are less than perfect. The other way the U.S. government gets new products is when they are designed and developed internally. These items are born into a laboratory testing environment. They spend years in testing and are tweaked by engineers prior to their unveiling to the inner U.S. government semi-secret societies.

Backdrop

40mm low velocity weapons and ammunition have been around since the 1960s. The M781 training round has been around almost as long and is virtually unchanged. Back in 2020, I wrote about the updates to the 40mm training programs. Since that time, the High-Velocity Pyrophoric program was terminated for convenience and the low velocity program is in limbo.

Some people call them chalk rounds since the projectile contains orange chalk-like material that makes a cloud of dust upon impact. Others call them "Cheeto" rounds since they are orange and look like the cheese flavored snack… and once you get the orange on you it stays on you- practically forever. One thing is for sure, they are fun to shoot. At only 250 fps, you can see



M781 Projectile vs. FCI 40x46mm Projectile

M781 Base case vs. FCI 40mm Base case

the round leave the barrel and watch it travel all the way to impact. This makes them unique.

The M781 round is surprisingly complex for such a simple round. Around 20 years ago, a guy from New Zealand thought he could make a better, cheaper, and less complex 40mm training round. He might have done it, however, it never gained mass acceptance globally and he never even got in the door with the US Army. It's now just a page in the history books. His name was Bill Sharplin and his company was Flexible Concepts. Sharplin ended up leaving the industry, and the company shut down not too many years after his big push to the U.S. government. The round's development never even got far enough to get an "XM" designation, indicative of experimental program cartridges that begin the trek to becoming type classified.

So, what makes the M781 so complex? Well, multiple adhesives are required to make it function properly. The windshield/ogive is glued on. If there is no glue or not enough glue, you can get a non-energetic "explosion" of orange dust right out of the barrel. If a large amount of glue is missing, and you avoid the in-barrel detonation, you might get a round that leaks dye all the way to the target. So, Bill thought he would remove all the adhesives to eliminate risk. Removal of the adhesives reduces cost and makes assembly easier. One of the M781 adhesives is a 2-part mix, similar to an epoxy, which must be mixed in a precise ratio to properly function. Dispensing and application of adhesives in manufacturing is very costly. More complex systems can cost over $100,000, just for the glue applicator. These systems must be able to meter the amount of two different materials precisely, then uniformly mix the two parts and dispense it onto the part. If the ratio is incorrect, the items will never fully cure. If the glue sits too

FN MK 13 EGLM (Enhanced Grenade Launcher Module)

LMT 12-inch Standalone Rail Mounted M203 Grenade Launcher

long in the applicator, it will start to cure and harden.

The M781 projectile's weight comes from its zinc body. The body is die-cast and rather expensive to produce. Molds cost $40,000 to $80,000, therefore runs of the die-cast parts need to be large to be cost-competitive. So, Bill opted for a 2-piece design with the weight coming from a piece of steel cut from standard bar stock held in a plastic piece that contained the rotating bands. The steel bar stock requires no tooling and is available from a multitude of sources. You can cut the steel parts to order on a simple Swiss saw and have less money tied up in raw materials. This is a big advantage for smaller runs.

Sharplin's black plastic base case was cheaper to manufacture than the current white color due to resin selection and the ability to use any re-grind color. The design had a reinforced node to prevent the cracking that often occurs in this area. The .38 Smith & Wesson blank on the inside was star crimped versus roll crimped.

Sharplin's design also had a segmented nose in the ogive/windshield to assist in better dispersion upon impact. This supposedly gave the round a bigger and better cloud at the impact site. Sharplin's design used a bright pink, instead of orange, dye and slightly different material to improve the "dusting" effect. In short, his design was better on paper. It was less complicated and easier to manufacture.

Sharplin took his idea to the US Army after he had some success in Australia and New Zealand with hopes of selling the product, or its design. It was not surprising that the U.S. Army was not interested.

Why was the Army not interested in the least? The M781 works and has worked. The risk of a new design had untold hidden costs. The Army has hundreds of thousands of dollars in testing and evaluation under its belt for the M781. The cost to duplicate that would be astronomical, and the testing would take years. Now, 20 years later, we know that the tight slip/press fit of the ogive to the body results in nearly 100% stress crack of the ogive. The Army would have discovered this in stress testing. Who knows if it could have been perfected? At the time, M781 had three contractors producing for the US Army – Amtec, MAST, and Teknocraft. Amtec and MAST were doing two and three lot acceptance tests per month each. Literally, thousands of rounds were being tested each month by the Defense Contract Management Agency (DCMA) to validate the LAT results, overall design, and minor approved variations of each contractor. If there were issues with the design, the DCMA would have not approved the LAT. The contractor and the Army customer would have to modify the test plan, specifications, or drawings in order to obtain the DCMA's eagle stamp of acceptance.

It would cost the Army a lot of money to buy his rounds and run them through an initial battery of tests. Let's assume they need to buy 20,000 parts at $10 each for a total of $200,000. Then, there's the costs to run an evaluation, probably another $200,000. Then they would still need to buy his design. I'm sure he would've wanted at least $100,000 for his investment and probably more. He probably had $100,000 in the three injection molding dies. At the time, the Army had no need and no funding for a replacement. They had the funds to buy millions of rounds of their existing design, and no funding that would allow them to consider a replacement.

Other Reasons Why a New Design Gets Nowhere

Time, energy, and funding are all organizationally limited. When you have other things that are truly broken, why mess with something that doesn't need attention. Lesson to the mad scientist – fixing things that are not broken is going to be more difficult.

TIMING - Historically speaking, in 2004, the Army's 40mm people were in the middle of several major efforts. The war effort was number one. Number two was the transition to the 40mm Systems Contracting concept. This meant instead of the Army cutting nearly 40 contracts for all 40mm ammunition, they were hoping to issue only a handful. The Systems Prime Contractors could cut purchase orders to the lower tier suppliers instead of the Army needing to do it.

FOCUS - The Army had other, newer priorities. Some of these priorities came from after-action reports or other needs as indicated by the ser-

vices. One such priority was the successful change in coupling for the 40mm High Velocity (HV) M16 links. This change allowed for more flex in the belt and easier delinking and relinking of belts in the field.

NOT MADE HERE - There is also an element of pride. There is pride in the M781 being a USA design. There's pride in it being the most used 40x46mm training design in the world. There is pride from the engineers at Picatinny Arsenal, the keepers of the design and those responsible for its continued success. The Picatinny crowd is a family like any other organization. In fact, some outsiders call it the "Picatinny Mafia." Many people there have parents and grandparents that originally developed the item or worked the programs for years. They should be proud of their friends and families' efforts for our armed services. A big shout out to all of the Picatinny people and thanks for their service on this and an untold number of programs.

A Better Path

How does one get their better mousetrap to be purchased by the USG or other major enterprise? Here are the things to look for:

NEED – Multiple groups are looking for innovation within the USG like Defense Advanced Research Projects Agency (DARPA), DoD Ordnance Technology Consortium (DOTC), numerous Other Transactional Authorities (OTAs) and many more. The DOD also uses a Cooperative Research and Development Agreement (CRADA) or other research and development contracts. If the item is used and type classified by another country, evaluation funding could come from a Foreign Comparison Testing (FCT) program. Even with these options, cold-calling with a new design is a waste of time. Find out their needs from their requirements documents or annual project plan, then design and build that better mousetrap. There are numerous other agencies like these and professionals that are experienced at partnering with the next Einstein to bring an idea to fruition.

EXPERTISE – Even with DOTC or DARPA, the odds of the basement engineer going from zero to hero is slim. Working with a company or individuals that have a background in the arena is critical. The skill and art of taking a design and injecting it into the U.S government is time-consuming and expensive. The biggest success of this type in the area of 40mm weapon system development was had by NICO of Trittau, Germany and its work on the Mk281 round. NICO was a sizable small business with hundreds of employees founded in 1949. It had a proven design that solved a huge problem in 40mm HV ammunition. The issue was caused by having a clock-like mechanical fuse in a training round that resulted in duds; the Mk281 solved the problem. Despite NICO's expertise in 40mm ammunition development, it still took them years to get it officially in the U.S. Marine Corps' inventory.

FUNDING – No matter the path, doing anything with the U.S. government takes money. Even with DOTC or DARPA programs, it still takes money and a lot of time. When your product is selected by a group there are multiple funding opportunities during each development phase to help develop the product. It's nowhere near enough to fully cover all the development costs, just enough to keep it going. As highlighted above, $500,000 would have been needed to perform a basic evaluation test on the 40x46mm round. Advice to all crackpots, if a company offers you ANY money for your basic design, it is probably a good idea to take it. The cost to fully develop and qualify a military item could be astronomical. Similar rules apply to private sector items. The odds of success are slim and the path is long.

PATIENCE – OTIS Products was a small business started in 1985. It had the better mousetrap in its pocket in the form of an "in the field" cleaning kit. The company was gaining commercial success. Most people that saw it knew it was a great idea, and the military was a prime prospect. It started pushing the Department of Defense for a contract in the 1990s and had to modify its design numerous times before getting a contract. It took around 10 years for OTIS's first efforts with the Army to pay off. It struck gold in 2005, 20 years after starting the business, with major efforts to support the United States' overseas wars. Its last 20 years has seen nearly $350 million in government contract awards. In 2000, it was awarded $377000, by 2004 $6,000,000 and by 2008 a whopping $55 million, which is the company's largest year of awards in the last 20 years.

DEMONSTRATION - Another option is to present the concept at industry events like the National Defense Industrial Association (NDIA) Small Arms conference. Your paper would need to be selected for presentation present. The live fire demonstration does not require any group approvals to shoot. However, depending on the year, the range may require vetted ammunition. Of course, there are numerous examples of companies that spent decades trying to promote their idea and got nowhere. Two examples that come to mind are Metal Storm and the General Dynamics Medium Machine Gun in 338 Norma Magnum (technically, this did come around 15 years later).

PATENT - If the idea is that good, it is probably worth the time and expense to file for that patent.

That's a Wrap

The world needs more innovators, and we live in a time when a great idea can become an overnight success via numerous platforms with relative ease. Your path to success could be GoFundMe, Shark Tank, Rocket Pitch, or Angel Investors. Do your research and choose wisely. In my professional opinion, the chances of being successful in ammunition and weapons is considerably slimmer and less likely to get the turbo boost from one of these avenues.

Hopefully, this article can be a guide if your better mousetrap is destined to be used by the U.S. government, the DOD, or other larger, more complex entity. Success isn't impossible, just more difficult to come by with these types of customers. Find the right partners to walk the trail with you via industry organizations like NDIA in the defense sector or Sporting Arms & Ammunition Manufacturers Institute (SAAMI) within the firearm and ammunition arenas. SADJ

* * *

About the Author: *Jay has worked in ammunition manufacturing and the gun industry for more than 40 years. He grew up in two family businesses – Bell's Gun and Sport shop in Franklin Park, Illinois, and Brass Extrusion Labs Limited (B.E.L.L.), a custom cartridge case production facility, ammunition loading, pyrotechnics and US Government prime contractor, in Bensenville, Illinois. Jay has been manufacturing 20mm to 40mm ammunition for U.S. and foreign government customers since the late 1990's while working, first, for MAST Technology and, later, for Ultra Defense Corp (UDC) USA. Jay consults on the side and writes articles in whatever time he has left.*

SHOW REPORT: 2021 ARMS AND SECURITY

BM Oplot Battle Tank

News from the 2021 Arms and Security Exhibition

The 17th international specialized exhibition Arms and Security – 2021 took place on 15–18 June 2021 at the International Exhibition Centre. Despite the difficulties of the COVID-19 pandemic, the current exhibition confirmed its status as a significant event of this type in Eastern Europe in terms of the number of exhibitors, the range of equipment and innovations, the level of representation and popularity among the public.

Guests and Delegations

Foreign delegations from 24 countries, which arrived by the invitation of the Ministry of Defense of Ukraine, Ministry of Internal Affairs of Ukraine and Ukrspecexport SC, took part in the opening ceremony and the working days of the exhibition. The delegations represented the following countries:

Spain, Poland, Moldova, Lithuania, Czech Republic, France, Croatia, Turkey, Qatar, Sudan, UAE, Egypt, Pakistan, USA, Ethiopia, Uganda, Kazakhstan, Bulgaria, Saudi Arabia, Georgia, Greece, Romania, Vietnam, Nigeria

General Information

309 companies represented the Ukrainian defense industry:

1. Joint expositions of organizations
   - Ukroboronprom SC – 42 companies
   - National Association of Ukrainian

Sokil-300 Combat UAV

Defense Industries – 18 companies
- League of Defense Companies of Ukraine – 23 companies

2. Expositions of the relevant ministries and agencies:
   - Ministry of Strategic Industries of Ukraine
   - Ministry of Defense of Ukraine
   - Ministry of Internal Affairs of Ukraine
   - National Security and Defense Council of Ukraine
   - Ministry of Education and Science of Ukraine
   - Security Service of Ukraine
3. Individual stands of state-owned and private enterprises.

Participating companies represented the following countries: Ukraine, USA, Brazil, Austria, Czech Republic, Kazakhstan, Lithuania, United Arab Emirates, Turkey, Poland, France, Pakistan, Israel, Belarus.

Amulet Multi-Mission Launcher

Exhibition Highlights

This year, the Concern's exposition was represented by 42 companies that displayed their exhibits on a joint stand in the hall and outdoors.

The flagship of the Ukroboronprom SC was the **BM Oplot** battle tank manufactured by the **Malyshev Plant in Kharkiv**. This armed vehicle is respected as one of the world's best tanks. The armed vehicle is intended for combating all types of ground-based and low-speed ,low-flying aerial threats.

The real highlight of the exhibition was the display of the **Luch State Kyiv Design Bureau** that brought a lot of interesting and unique equipment. The mock-up of the first domestic **Sokil-300** combat unmanned aerial vehicle attracted a lot of attention. The first prototype is to be assembled by the end of this year. Representatives of the Luch Design Bureau stated the unmanned aerial vehicle would perform both strike and reconnaissance functions. Therefore, the configuration of the UAV will depend on its purpose. The head of the Design Bureau, Oleh Korostelov, noted the domestic UAV would have several advantages over the Turkish Bayraktar TB2 UCAV and would be a worthy alternative. The main advantage of Sokil-300 will be its ability to perform in poor weather conditions.

Another interesting display was a mock-up of the **Coral** anti-aircraft missile. It's designed to shoot down modern fighters, helicopters, cruise missiles, ballistic missiles and UAVs.

For the first time, the Design Bureau presented the **Amulet** missile system designed to equip armored vehicles and adapted to use the anti-tank missiles for the Skif system. The Amulet is adapted for the use of both RK-2S and the latest anti-tank RK-2″ missiles. In addition, the Design Bureau presented the **Bar'er-VK** naval missile guided weapon system. The system is intended to destroy ships, ground armored targets and helicopters with RK-2V missiles. The Design Bureau also demonstrated another system called **Sarmat** that can be equipped on combat vehicles as well as on naval and coastal vessels. The weapon set of this system is a 12.7mm KT-12.7 machine gun and two RK-3 guided missiles

SHOW REPORT: 2021 ARMS AND SECURITY

Smereka 120mm Mobile Mortar System

UkrInnMash Kevlar-E Infantry Fighting Vehicle

in transport launching containers. The Luch State Kyiv Design Bureau presented the **Bar'er-S** upgraded self-propelled anti-tank missile system equipped with the Bar'er-V RK-2V guided missile designed by the Bureau, with a firing range of 7.5km.

The Artem State Joint Stock Holding Company offered visitors several developments. The first one was an unguided missile for the Speka system, the **RS-122TB** with a thermobaric warhead. This ammunition is designed to destroy unsheltered manpower, unarmored and lightly armored vehicles, and enemy infrastructure elements such as a mobile command post or UAV launching positions.The next development demonstrated by Artem is a remotely piloted aircraft system called **Myslyvets**. This system is designed for air delivery of various types of warheads. In particular, Myslyvets can deliver a pre-fragmented warhead with an explosively formed

Proximus LLC Bukovel-AD R4 EW System

penetrator to destroy hostile fighters, light watercraft, unarmored and lightly armored vehicles.

The Artem SJSHC also demonstrated its newest 152mm kinetic blast fragmentation shell called **KOFS-152**. This shell is for 2S5 guns and, paired with a Zh-48 charge, is designed to destroy various targets and hostile manpower with kinetic, fragmentation and high-explosive effects.

Representatives of the **Kharkiv Design Bureau of Engineering (KMDB)** presented the latest modification to the **Ukrainian BTR-4**, designed specifically for the Marine Corps. According to the Bureau's engineers, the vehicle differs from the mass-produced BTR-4 in weight, being two tons lighter. The vehicle body is equipped with so-called "floats" to improve its buoyancy, making it better suited for amphibious operations.

VK System Oncilla Armored Vehicle

The exhibition visitors were pleasantly surprised to see a new association of private defense companies – the **National Association of Ukrainian Defence Industries (NAUDI).** The appearance of NAUDI was impressive as its exposition was one of the largest. NAUDI united 18 participating companies under its display. Wheeled armored vehicles, automated troop control systems, artillery weapon systems, radar systems, and much more were displayed at the combined stand.

Ukrainian Armor Design and Manufacturing Company demonstrated **Smereka**, a 120mm mobile mortar system based on the Varta armored vehicle. It is a system with automatic deployment and targeting, with large-scale digitization and integration into modern command and control systems. All this makes it possible to destroy

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Mad Nomad Nomad High Mobility Vehicle

hostile targets quickly and redeploy to a new position before the enemy can strike back. Ukrainian Armor carries out the Smereka R&D by order of the Ministry of Defense of Ukraine.

For the first time, the company demonstrated **Novator**, an armored vehicle with a 12.7mm NSVT combat module, and includes the option of a equipping a Browning M2 machine gun.

UkrInnMash Corporation presented the **Kevlar-E** armored personnel carrier.

The Kevlar-E amphibious full-track fighting vehicle is intended for transporting mechanized infantry personnel, providing fire support, and destroying modern armored and unarmored combat vehicles, low-flying low-speed air targets, sea targets under naval coastal warfare operations and other separate ground targets.

Another NAUDI participant, **Tritel Company**, presented the **NOTA system**. It's designed to combat UAVs,

Milanion AGEMA 8x8 UGV

Tatra Chassis for ZRK-SD AA Missile System

block mobile networks, and counter radio-electronic and radar reconnaissance assets. The NOTA can take a direction-finding bearing of radio emissions and jam wireless communication channels, satellite navigation, remote control systems, telemetry data transmission signals, and technical reconnaissance assets.

Representatives of the **Kramatorsk Heavy Machine Tool Plant** demonstrated its 155mm self-propelled, wheeled, far-ranging, quick-firing howitzer with automatic loader, **Bohdana R&D**. The Bohdana is intended to carry out direct fire strikes on hostile front-line forces and general fire strikes at a range of up to 40km, depending on the shell type. Unfortunately, the vehicle itself was not presented at the exhibition, as it was undergoing state testing at the time.

Ukrspecsystems, a Ukrainian manufacturer of UAVs and ground equipment for unmanned aerial systems, presented its **PD-2 UAS** system. Having analyzed the lessons-learned in Eastern Ukraine and the feedback from users and partners, the company created a high-tech and versatile product capable of operation in harsh weather conditions anywhere in the world.

Another highlight of the exhibition was the exposition of the **Proximus LLC**. The company presented several developments, including the **Prometei-MF5** universal electronic warfare support station. This station is designed to jam unmanned systems, artillery radars, navigation systems, communications between command posts and military equipment. The Prometei-MF5 station has a reconnaissance and direction-finding range of 30km and a radio jamming range of up to 25km. In addition to Prometei, the the company also displayed its **Bukovel-AD R4** Anti-Drone EW**F**. The system is also designed to disrupt unmanned aerial vehicles' flight missions through radio-electronic impact on onboard radio-electronic systems of UAVs. The Bukovel-AD R4 features a passive system for detecting and finding the direction of UAVs. Russian Orlan-10 UAVs can be detected at a distance of 70 to 100km, and the Bayraktar TB2s at a distance of 200km. The effective jamming range is up to 16–20km. Deployment time is two minutes. According to the company representatives, the Bukovel-AD R4 is popular abroad that the company has orders queued until 2022. During comparative tests abroad with Israeli, German and other systems, the Ukrainian development shows better performance.

The **VK System Research and Production Company** demonstrated the **Oncilla** armored vehicle. The vehicle was developed by the Polish company Mista but is manufactured near Kyiv and is a Ukrainian-made vehicle. According to the Ukrainian military, which already use this vehicle, it has already been tested in various conditions, including both in summer and winter, has a record of continuous column marches of up to 1000km, is built for extreme terrain and impassable road mobility. The vehicle is equipped with a remotely operated combat module fitted with a 12.7mm NSVT machine gun designed to destroy lightly armored targets, fixed-fire units and manpower, as well as low-altitude and low-speed air targets. The combat module is controlled by an operator from inside the combat vehicle. The developers say that, due to its large payload and versatility, the Oncilla armored vehicle has significant potential for further development. In particular, the developers assert that the Oncilla can easily be converted into an NBC reconnaissance vehicle, command and control vehicle, reconnaissance or patrol vehicle, self-propelled anti-tank system, ambulance, police vehicle, or other special variants.

Another newcomer, the **Mad Nomad** company, made a splash among visitors with its all-terrain vehicle. The **Nomad** vehicle is designed for off-road driving. It can be used as a supporting asset, opening up new opportunities for border guards, engineering corps and forest ranger brigades to use it as a patrol or ambulance vehicle, for water crossing, and to perform reconnaissance missions. The Nomad has a number of unique features that distinguish it from similar all-terrain vehicles.; in particular, a wheel torque of about 10,000Nm. Thanks to its design, the all-terrain vehicle can overcome ground obstacles and glide through the water. With this capability, the vehicle can called an amphibious all-terrain vehicle.

The exhibition's show stopper, the Ukrainian multi-purpose stealth UAV by **AIR COMBAT EVOLUTION** company, will be the last highlight from Ukraine.

This ambitious project was developed by the best Ukrainian aerospace industry specialists and led by former CEO of the Antonov SE, Oleksandr Los, and former head of the State Space Agency of Ukraine (SSAU), Volodymyr Usov. The UAV was developed in partnership with **Ivchenko-Progres SE**, **Motor Sich JSC** and **Hydrobest LTD**. Thanks to the latest stealth technology and its flat wing shape, the **ACE**

SHOW REPORT: 2021 ARMS AND SECURITY

Air Combat Evolution ACE-1 UAV

ONE UAV is virtually invisible to radar and difficult to detect. The ACE ONE is capable of near supersonic speed of 1,000km/h. It's controlled by an artificial intelligence system that can control a swarm of such UAVs. The domestic UAV will not only perform reconnaissance operations, but it will also engage ground and air targets using high-precision, guided weapons that are located in two large internal payload compartments.

Foreign Exposition Highlights

The participation of the leading American company **Lockheed Martin**, is significant for Ukraine and a highlight of the show. The main purpose of their participation was to promote the latest modification of the **F-16 Fighting Falcon** to the Ukrainian market. The upgrades center on electronics of the fighter jet; a new onboard **APG-83 (SABR)** radar that detects and identifies targets in the air and on the ground at long distances, as well as onboard electronic warfare upgrades with jamming systems, helmet-mounted target designation system, Link 16 tactical data link, and much more.

Another exhibitor, no less famous than Lockheed Martin, was Brazilian aircraft manufacturing conglomerate **Embraer.** The company benefits as a strategic partner of the Aviasvit–XXI Aviation and Space Salon. The conglomerate demonstrated the **A-29 Super Tucano** light attack aircraft and the **KC-390** military transport aircraft that's competitive with the Ukrainian An-178.

The Czech company **Tatra** presented a chassis for the Ukrainian **ZRK-SD** anti-aircraft missile system from **Luch State Kyiv Design Bureau**. During the exhibition, it was announced that the coastal version of the Ukrainian **Neptun** system would get a completely new chassis. All first division special vehicles will be based on adapted off-road vehicles from the Czech manufacturer, instead of KrAZ trucks. The first production samples of the Neptun anti-ship system will be shown during Ukraine's 30th anniversary Independence Day military parade.

The exhibition newcomer, French shipbuilder **OCEA**, showcased the results of its cooperation with Ukrainian partner, the **Nibulon** company. The Ukrainian-French partnership began in July 2020 when Nibulon, the leader of the Ukrainian shipbuilding industry, signed a Memorandum of Understanding with OCEA to build OCEA **FPB 98 MKI** fast patrol boats as part of a government project to enhance maritime security and border protection in Ukraine. 20 boats will be delivered under the contract, 15 built by OCEA and 5 by Nibulon. Various production processes were demonstrated over four days in real-time using remote cameras from Nibulon's workshops, which is fitted with equipment from the world's leading manufacturers.

After its successful participation in 2019, Turkish **Menatek,** a producer of components for light and heavy military vehicles, has decided to become an annual exhibitor. Company representatives stated that our market has become attractive to them, as Ukraine is rapidly adopting NATO standards and is in an active phase of designing and developing high-level equipment. According to the company representative, they were already in contact with several major companies and had even developed the running gear for one company's armored vehicle.

The stand of another newcomer, Turkish **MKEK** (MECHANICAL AND CHEMICAL INDUSTRY CORPORATION), attracted a lot of attention from official delegations and visitors. The company representatives demonstrated their developments in small arms and presented news of their latest project – a new 76mm naval gun.

Milanion Company (UAE) which is a member of the joint exposition of the National Defense Industry Association of Ukraine presented the **AGEMA** 8x8 unmanned platform in the association's booth. It is a high performance, fully modular, fast, and adaptive unmanned ground vehicle. The multi-role, amphibious platform is equipped with proven, world-class systems and fitted with a customizable, sealed deck that can be adapted to any mission-specific payload. It is controlled remotely and can be programmed to perform autonomous missions.

The AGEMA is built for extreme terrain mobility with high torque, a heightened traction, independent suspension, a low center of gravity and the ability to climb steep, 40-degree inclines. SADJ

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ARES

This is a "Gift" Tariq for sale for 1600 USD on an Iraqi Telegram channel recently. Notice that the seller refers to the pistol specifically as the Presidential Gift in the text.

ARES

Note the variations in English stampings on right side frames. From earlier (top) to later (bottom).

A Gift from Saddam

Examining Commemorative Tariq Pistol Variants

Story by Miles Vining | Photography Armament Research Services (ARES)

Similar to its Iraqi Tabuk carbine and Al-Qadisiyah sniper rifle cousins, the state-made Tariq line of self-loading pistols featured several presentation variants.

The gold-plated weapons are perhaps the best known of these presentation handguns, with the 9×19mm Beretta-licensed 1951 production variants and the 7.65×17mm Beretta-licensed Model 70 variants seen most commonly. Some of these have presentation engravings on the slides instead of the standard Arabic inscription on the left side and English inscription on the right.

But, beyond these presentation Tariqs, we have the "Gift /هدية variant which, to date, has not been found with any gold plating and is instead a standard 9x19mm Beretta Model 1951-patterned Tariq differing only in the elegant presentation scroll on the right side of the slide. The left side of

ARES

Examples of early to late production Tariq M1951-patterned handguns. Note the progression from Diwani script to a thicker Kufic-style of script at the end, in addition to the addition of a "0" numeral preceding the serial number. All known 9 × 19 mm Tariqs begin with a 313 serial number while the 7.65 × 17 mm Tariqs begin with a 315 serial number. Tabuk and al-Kadesiah rifles are similarly configured with initial digits for series of variants.

the slide features the standard Arabic roll-marked inscription "Caliber 9mm, Al-Qadisiyah Establishments, Iraq". However, the right side of the handgun bears the following inscription:

الوطن شرف المقاتل – هدية الرئيس القائد
صدام حسين لمن دافع عن وطنه

According to Omer Sayadi of **MENAsymbolism.com**, this translates to, "The nation is the honor of the warrior – A gift from the president, the leader Saddam Hussein for whoever fights for his country."

Conversations with local sources familiar with this variant reveal this particular handgun is well-known throughout Iraq and is simply referred to as the "Gift" handgun, or "Gift Tariq." Furthermore, it's widely known these handguns were presented to certain families and widows of

IRAQI SOCIAL MEDIA VIA ARES CONMAT DATABASE

In this image taken from social media, the right side of a slide, Diwani style. Note the missing grip handle screw. Original caption:
مسدسات طارق صناعه عراقيه في عهد الركن المهيب صدام حسين الله يرحمه

Fine Diwani Roll-Mark Variants

VINTAGE MODERN FIREARMS

This image shared on social media shows an unfired Tariq 9mm, President-Issued variant. Right side of the slide, Diwani style.

Iraqi soldiers killed during the 1980-1988 Iran-Iraq War. We are trying to pin down specific accounts in which these were presented that would tell us of what types of families received the handguns. As an example, it's possible that families whose husbands were involved in certain actions were thus presented with the Gift Tariq as a posthumous medal of some sort.

Thus far, we've managed to identify at least three different variants of the Gift Tariq. Serial numbers are hard to find on these handguns, as the available photographs that display them tend to focus on the Gift inscription rather than the left side of the handgun, which features the serial number

VARIOUS IRAQI SOCIAL MEDIA MARKET ACCOUNTS VIA ARES CONMAT DATABASE

Original caption: "1600 مسدس تسعة انعم هديه ألريس مكفول للبيع". **Right side slide, Diwani style.**

on the frame. From a cursory inspection, it appears production of the Gift pistols followed production of the standard versions in that the Gift pistols appeared to simply be same-year production versions with no markings on the right side of the slide that were later roll-marked with the commemorative inscription.

In regard to the standard inscriptions, Iraqi small arms enthusiasts claim the earlier Tariqs with a finer marking in the Diwani cursive style of script and with "Tariq 9mm Iraq- Licensed by Beretta" on the right side of the handgun were produced in Italy by Beretta for Al-Qadisiyah Establishments, while those with the rougher

In this social media image is the left side of the slide, reverse of the previous pistol.

SOMETHINGAWFUL.COM

Right side of the slide, Diwani style.

SOMETHINGAWFUL.COM

Left side slide of the previous handgun, note the lack of any stamping on the right side. Also note the serial number begins with "0", indicative of very late production Tariq handguns.

Thick Diwani Roll-Mark Variants

ALSUMARIA

Right side of the slide, thick Diwani style. Original caption: "تناقلت عددا من وسائل الاعلام العربية، السبت، ان الشرطة الإسرائيلية ضبطت مسدسًا أهداه الرئيس العراقي السابق صدام حسين إلى شخص مجهول، في قرية كفر قاسم العربية بإسرائيل".
Specifically mentions being a gift gun.

GUNBOARDS.COM

Right side slide, thick Diwani style.

and blockier Kufic style of script, which lack the phrase "Licensed by Beretta", were produced in Iraq.

Along with these standard inscriptions, we also see earlier Diwani versions with the following inscription in Arabic stamped on the left side of the slide, also translated by Sayadi:

طارق – عيار 9 ملم منشأة القادسية العامة – العراق

"Tariq – 9 mm Caliber – Al-Qadisiyah Establishments – Iraq"

This changes to a different inscription in Arabic when the Kufic text is used:

طارق- عيار 9 ملم- صنع في العراق

"Tariq- Caliber 9mm – Made in Iraq"

Serial number evidence does corroborate this theory in that the earlier and late serial numbers match the Diwani and Kufic styles, respectively. Here, it

GUNBOARDS.COM

Right side slide, thick Diwani style.

Thick Diwani Roll-Mark Variants

VINTAGE.AND.MODERN.FIREARMS, INSTAGRAM

Right side of the slide, Kufic style. Original caption- "This is a Tariq 9mm, given by the Iraqi Dictator Saddam Hussein as a present to the Iraqi senior officers. The slide says 'The nation is the honor of the fighter. A present from the president, The Leader Saddam Hussein, to whom defended the nation.'"

ARMOURY BLOG

Kufic style, Gift gun.

must be noted, this Diwani and Kufic differentiation corresponds with the English markings on the reverse side, in that they are also either finer like the Diwani variants or blockier like the Kufic variants. Various representative examples are featured in the accompanying images. SADJ

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A version of this article appeared in Silah Report, a project of Armament Research Services (ARES) monitoring arms and munitions developments in the Middle East, North Africa, and Central Asia. More original material is available at: ***silahreport.com****.*

INDUSTRY NEWS

Elbit Systems' UK Subsidiary Awarded $137 Million Contract to Supply the Future Target Acquisition Solution for Soldiers of the British Armed Forces

Elbit Systems announced that its UK subsidiary, Elbit Systems UK, was awarded an approximately GBP £100 million contract by the UK Ministry of Defence to provide the British Armed Forces with the future target acquisition solution for Joint Terminal Attack Controllers and Fire Support Teams under the Dismounted Joint Fires Integrators ("D-JFI") program. The contract will be performed over a five-year period.

The D-JFI solution to be provided by Elbit Systems UK, is a networked, passive and active target acquisition solution that acquires, generates and communicates target information to effector systems for effective engagement of joint precision and non-precision fires. The solution is empowered by Artificial Intelligence and will interface with the radio communication systems of the British Army, Royal Air Force and Royal Marines. The D-JFI solution draws on the Company's operational experience in providing dismounted network combat solutions. It integrates several of its technologies, including: the TORCH-X Battle Management Application; the Hattorix™ system for undetectable generation of high-precision targets, the CORAL Multi-Spectral electro-optical payload for enhanced target acquisition in day and night and the Rattler XR long range laser designator. The D-JFI solution will enable fast and secured transmission of target information across the British and Allied Armed Forces, allowing swift and accurate utilization of artillery and close air support.

Winchester Ammunition Awarded U.S. Army Contract

Winchester has been selected by the U.S. Army as the second source provider for small caliber rifle ammunition. This most recent contract is for 5.56mm, 7.62mm and .50 caliber ammunition with an initial order of $37 million and is the third consecutive second source contract Olin Winchester has received.

"Winning this contract, combined with being selected as the operating contractor at the Lake City Army Ammunition Plant, solidifies Winchester's position supplying small caliber ammunition to the U.S. military," said Brett Flaugher, president of Winchester.

"Winchester has proven time and again that we can meet and exceed the exacting standards required by our military customers," said Kevin Noonan, director of military programs and strategy. "The reason you see Winchester continue to win these contracts is because we are delivering quality, cost-effective products on time."

Since World War I, Winchester has been the U.S. Army's largest commercial supplier of small caliber ammunition and has met the needs of law enforcement and U.S armed forces with decades of support at the highest levels.

SENTRY Products Group Expands Special Operations Division

SENTRY Products Group announced the expansion of its Special Operations Division and the hiring of retired Navy SEAL Command Master Chief, Will Dewilde.

The Special Operations Divisions (SOD) focuses on building relationships and supporting the development and distribution of SENTRY products across the military and law enforcement channels.

Command Master Chief Dewilde retired from the United States Navy in 2017 after serving more than 30 years in various operational and strategic leadership roles across USSOCOM. He has completed 17 overseas deployments and has planned and led numerous sensitive national combat and crisis response missions worldwide. His operational assignments and executive level leadership tours include the Naval Special Warfare Development Group (DEVGROUP), SEAL Team Two, Joint Special Operations Command (JSOC), United States Special Operations Command (SOCOM), Naval Special Warfare Center and Naval Special Warfare Group Two. He has been awarded the Silver Star and four Bronze Stars for Valor along with many other medals and various unit and campaign awards. Prior to joining SENTRY, he served as Vice President of Operations for The Honor Foundation (THF), a nationwide educational institution assisting U.S. Special Operations service members in their career transitions.

Dewilde said, "It's a privilege to be able to continue to serve the military and law enforcement communities as part of a team that is dedicated to designing, manufacturing, and distributing the very best and most innovative products in the industry. I really embrace SENTRY's vision of 'Live to Protect' it represents the passion of our people, the products we create and sums up what we bring to the customer through the SOD Division."

Will Dewilde

Frequentis Joins Integrated Drone Air Traffic Control System Project

Dronecloud, the drone flight management software provider, has selected Frequentis to join the Project Rise consortium. The group is collaborating on the development of open standard integrations to help unlock beyond visual line of sight (BVLOS) drone flights in the United Kingdom. Frequentis will support Dronecloud and the consortium with its unmanned traffic management (UTM) solution – MosaiX UTM.

"The key to unlocking the full potential of drones is allowing them to fly beyond visual line of sight," says Frequentis Vice President of Business Development Guenter Graf. "To operate under these conditions both manned aviation and drones must have access to a shared air situation picture. Together with Dronecloud and other consortium members we intend to demonstrate an unmanned traffic management ecosystem, incorporating end-to-end communication and an approval process between drone operators and air traffic control authorities."

Frequentis' smartSIS tower application allows airspace rules and restrictions to be set fairly for all airspace users. The solution provides an integrated air situation picture and supports real-time decision-making. In addition, MosaiX UTM includes a foundation for unmanned airspace services and cloud information services, serving as the "single source of truth" for relevant safety information.

Dronecloud, along with its Project Rise partners, is developing a standardized, automated digital flight approval solution ready to unlock BVLOS flights, safely at scale.

"If we get these critical building blocks right," says Dronecloud co-founder and CEO, Jan Domaradzki, "the hype around drone-based last-mile delivery in built up areas, and urban air mobility will become reality."

Dronecloud is leading the Project Rise consortium, formed as part of the Future Flight Challenge project, funded by the non-departmental public body UK Research and Innovation, through the multi-billion-pound Industrial Strategy Challenge Fund. The consortium is composed of key industry partners, including Frequentis, Sky-drones, Cranfield University and Skyports.

Elbit Systems Awarded $16m Contract to Supply XACT Night Vision Goggles to UK Armed Forces

Elbit Systems UK was awarded an approximately GBP £11.5m ($16m) initial contract by the United Kingdom Ministry of Defence to provide the U.K. Armed Forces with XACT Night Vision Goggles. The initial contract will be performed over an 18-month period with the potential for additional follow-on orders over a period of five years.

Under the contract, Elbit Systems UK will supply the lightweight micro binocular XACT nv33 NVGs in a helmet-mounted configuration. XACT nv33 NVG improves mission efficiency during dark conditions and enables safe, off-road vehicle driving without headlights. Systems from the XACT family have been selected by a number of NATO countries including Germany and the Netherlands, as well as by Israel, and are operationally proven.

Elbit Systems develops and supplies night vision goggles for a range of customers, including the U.S., the Netherlands, Germany, Israel, and others. In the past 18-months, Elbit Systems secured $95 million in orders for NVGs: for the U.S. Army's' Enhanced Night Vision Goggle – Binocular (ENVG-B) systems, the U.S. Marine Corps' Squad Binocular Night Vision Goggle (SBNVG) systems, the German Federal Polices' special forces and special operation units and the

Armed Forces of the Netherlands. This is the third contract award for Elbit Systems UK since the beginning of 2021, adding to the $166 million contract for maritime training technologies and the $137 million contract award for the future target acquisition solution (D-JFI).

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